MITSUBISHI ELECTRIC

SPLIT-TYPE,HEAT PUMP AIR CONDITIONERS

1997

No. OC123

TECHNICAL & SERVICE MANUAL

Series PLH Ceiling Cassettes

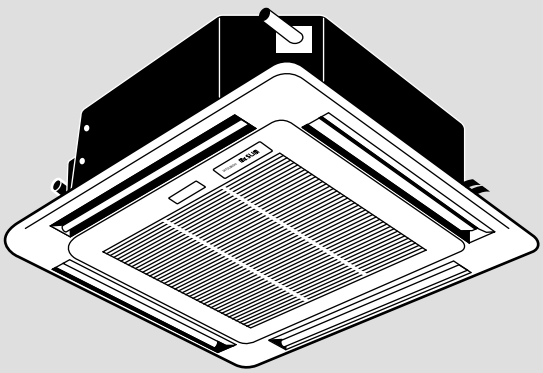
This manual does not cover the following outdoor units. When servicing them, please refer to the service manual No.OC128 and this manual in a set.
[Service Ref.]
PUH-1.6VKA2
PUH-2VKA2
PUH-2.5VKA2

Indoor unit
[Model names]

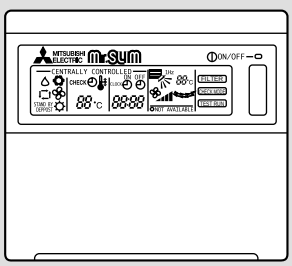
PLH-1.6KKHC
PLH-2KKHC
PLH-2.5KKHC

[Service Ref.]

PLH-1.6KKHC
PLH-2KKHC
PLH-2.5KKHC



INDOOR UNIT



REMOTE CONTROLLER

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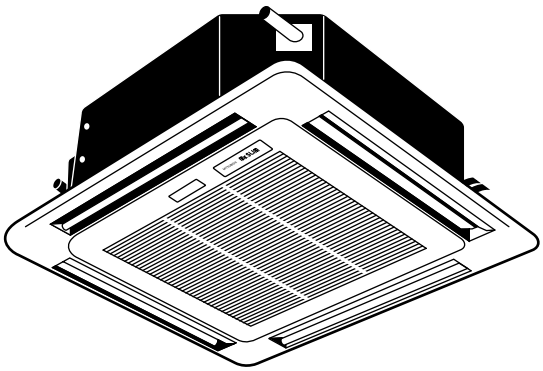
The Slim Line.
From Mitsubishi Electric.

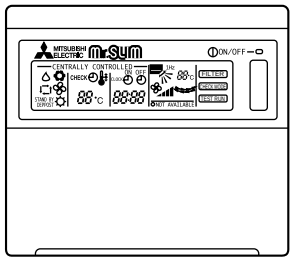
Mr.SLIM™

1 FEATURES

Series PLH Ceiling Cassettes



Indoor unit



Remote controller

Service Ref.	Cooling capacity/Heating capacity	
	W	Btu/h
PLH-1.6KKHC	4,400/4,650	15,000/15,900
PLH-2KKHC	5,400/5,800	18,400/19,800
PLH-2.5KKHC	6,300/7,200	21,500/24,600

1.PURSUING CONPACTNESS

(1)Panel size and body volume reduced to 64% of previous models

The width and depth of the panel have been reduced by 19cm respectively,resulting in a compact model which fits smaller environments (like shops) perfectly.

(2)Multi-application panels flexibly adapt to installation conditions.

Space panel and Wide panel may be installed on ceilings with shallow depth using the exiting opening .

2."SMUDGE-FREE", PRECISELY TARGETED AIRFLOW SYSTEM

The new control system regulates airflow to prevent smudging. A projection inside the air passage distributes air evenly over the top and bottom of the vane. Two projections on the air outlet work to prevent cooled air from rising to the celling, and also to stop outside air being dragged into the cooled air stream.

3.AIRFLOW ADJUSTABLE TO ANY INDOOR ENVIRONMENT

Airflow can be adjusted according to celling height and the number of air outlets. "Wide Zoming Flow" creates anoptimum airflow for any indoor environment.

4.A FURTHER REFINEMENT OF COMFORT WITH NOISE SUPPRESION

The celling 4-way airflow cassette has a special "silent-design". The "2-Tap"system allows a choice between silent and standard modes according to the height of the cellig. For ordinary residenced which have a low celling, selection of the silent mode will result in remarkable noise reductions.

5.ECONOMICAL AND EASY MAINTENANCE

(1)Push-open grill

Filter clogging is widely recognized as a cause of reduced perfomance, but up until now it has been troublesome to clean filters. With the "push-open grill" the fillter can be smoothly opened out at the push of a button, enabling speedy cleaning.

(2)An unprecedented level of vane-cleaning

The unique airflow system prevents the intake of indoor air. Dewing therefore does not occur, and the vane is flockless. The resulting level of dirt on the vane due to tobacco smoke, dust, etc. is very light,and can be wiped off easily with a neutral detergent

(3)Long-life fillter

This new celling 4-way airflow cassette employs a long life fillter which requires no maintenance for up to 2,500 hours of operation in general office environments. It adds uo to an ideal blend of comfort and low maintenance.

6.COMPACT DIMENSIONS MEAN EASY INSTALLATION

(1)Carefree suspension work with lightweight unit

The new unit weighs in at 20kg (9kg lighter than the previous model) and is easy to handle and install. What's more, suspension work is facillitated by compact dimensions ensuring a snug fit.

(2)Smooth installation with "one-direction"bolts

Suspension bolts can be fixes consistently from one direction easing suspension work.

(3)Trouble-free fitting work with slender refrigerant piping

Refrigerant piping has been reduced in size, and pipe-curving work at the installation site can now be completed quickly and economically. In addition, refrigerant and drain piping are set at different corners, which means that flare connections and drain piping heat insulation work can be smoothly and reliably implemented.

(4)Easy-access terminal and control panels for efficient wiring

When performing wiring work, progress can be checked on the power source terminal and control panels simply by removing the electrical parts cover. Adress setting can also be done easily from beneath at a convenient angle.

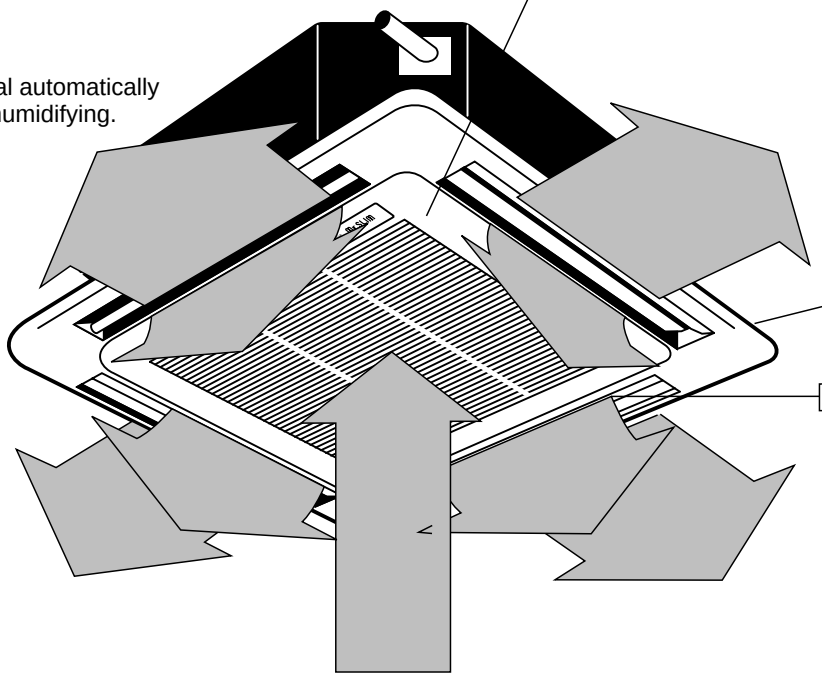
(5)"One-push"to provisionally position front panel

Panel weight has been redused from 7kg to 3.7kg. The previous 3-step process for provisionally positioning the panel has been streamlined, and now a simple "one-push" action at the diagonal corners fixed it into place, resulting in major time-saving.

2 PART NAMES AND FUNCTIONS

● Indoor (Main) Unit

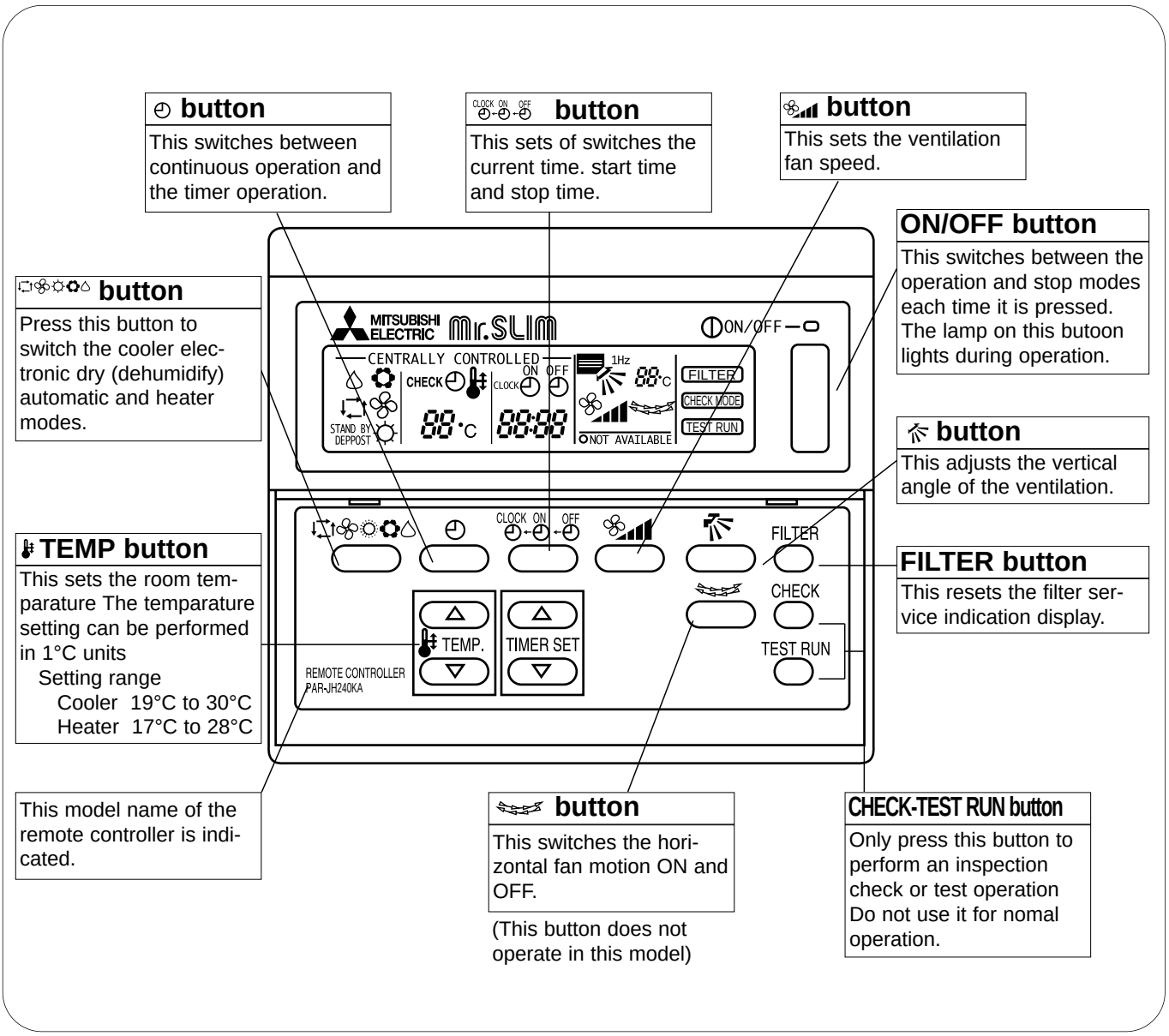
PLH-1.6KKHC
PLH-2KKHC
PLH-2.5KKHC


Filters
Remove dust and pollutants from inhaled air
Horizontal Air Outlet
Sets airflow horizontal automatically during cooling or dehumidifying.
Grill
Auto Air Swing Vane
Disperses airflow up and down and adjusts the angle of airflow direction.
Air Intake
Inhales air from room.

● Remote controller

● Once the controls are set, the same operation mode can be repeated by simply pressing the ON/OFF button.

● Operation buttons



button
This switches between continuous operation and the timer operation.

button
This sets of switches the current time. start time and stop time.

button
This sets the ventilation fan speed.

ON/OFF button
This switches between the operation and stop modes each time it is pressed. The lamp on this butoon lights during operation.

button
Press this button to switch the cooler electronic dry (dehumidify) automatic and heater modes.

button
This adjusts the vertical angle of the ventilation.

TEMP button
This sets the room temparature The temparature setting can be performed in 1°C units
Setting range
Cooler 19°C to 30°C
Heater 17°C to 28°C

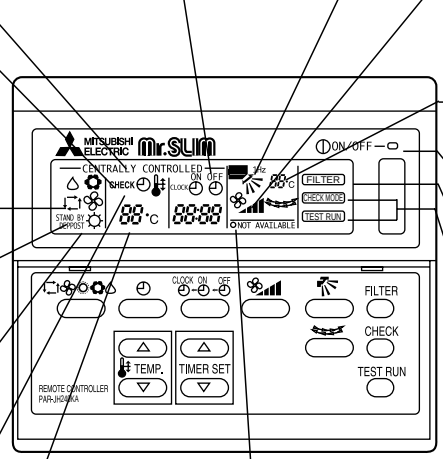
FILTER button
This resets the filter service indication display.

This model name of the remote controller is indicated.

button
This switches the horizontal fan motion ON and OFF.
(This button does not operate in this model)

CHECK-TEST RUN button
Only press this button to perform an inspection check or test operation Do not use it for nomal operation.

● Display



CENTRALLY CONTROLLED display

This indicates when the unit is controlled by optional features such as central control type remote controller.

ON OFF CLOCK display

The current time , start time and stop time can be displayed in tensecond intervals by pressing the time switch button. The start time or stop time is always displayed during the timer operation.

In this display example on the bottom left, a condition where all display lamps light is shown for explanation purposes although this differs from actual operation.

display

This displays the air direction.

display

This indicates when the continous operation and time operation modes are set.
It also display the time for the timer operation at the same time as when it is set.

display

The selected fan speed is displayed.

—88°C display

The temperature of the suction air is displayed during operation. The display range is 8° to 39°C. The display flashes 8°C when the actual temperature is less than 8° and flashes 39°C when the actual temperature is greater than 39°C.

OPERATION MODE display

This indicates the operation mode.

Operation lamp

This lamp lights during operation, goes off when the unit stops and flashes when amalfunction occurs.

STANDBY display

This indicates when the standby mode is set from the time the sleep operation starts until the heating air is discharged.

FILTER Display

This lamp lights when the filter need to be cleaned.

DEFROST display

This indicates when the defrost operation is performed.

CHECK display

This indicates when a malfunction has occurred in the unit which should be checked.

—88°C display

This displays the selected setting temperature.

⊙display

This lamp lights when electricity is supplied to the unit.

CHECK MODE / TEST RUN display

This display lights in the check mode or when a test operation is performed.

Caution

- Only the ⊙display lights when the unit is stopped and power supplied to the unit.
- When power is turned ON for the first time the (CENTRAL CTRL) display appears to go off momentarily but this is not a malfunction.
- When the central control remote control unit, which is sold separately, is used the ON-OFF button, button and TEMP button do not operate.
- "NOT AVAILABLE" is displayed when the button are pressed.This indicates that this room unit is not equipped with the fan direction adjustment function and the louver function.

3 SPECIFICATIONS

Item / Service Ref.				PLH-1.6KKHC	
Function				Cooling	Heating
Capacity			Btu/h	15,000	15,900[20,600]
			W	4,400	4,650[6,050]
Total input			kW	1.59	1.51[3.20]
INDOOR UNIT	**Service Ref.**			**PLH-1.6KKHC**	
	Power supply(phase, cycle,voltage)			Single, 50Hz, 220-240V	
		Input	kW	0.15	0.10[1.50]
		Running current	A	0.64	0.45[6.28]
		Starting current	A	0.70	0.50[6.91]
	External finish			Galvanized sheets with gray heat insulation	
	Heat exchanger			Plate fin coil	
		Fan(drive) x No.		Turbo fan [direct) x 1	
		Fan motor output	kW	0.030	
		Airflow(Low-High)	m³/min(CFM)	13-16(460-565)	
		External static pressure	mmAq,Pa	0(direct blow)	
	Booster heater		kW	[1.4]	
	Operation control & Thermostat			Remote controller & built-in	
	Noise level(Low-High)		dB(A)	32-37	
	Cond. drain conn. O.D.		mm,(in.)	32(1-1/4)	
	Dimensions	W	mm,(in.)	UNIT : 660(26)	PANEL : 760(30)
		D	mm,(in.)	UNIT : 660(26)	PANEL : 760(30)
		H	mm,(in.)	UNIT : 253(10)	PANEL : 30(1-1/8)
	Weight		kg,(lbs)	UNIT : 19(42)[20(44)]	PANEL : 3.7(8)[3.7(8)]
OUTDOOR UNIT	**Service Ref.**			**PUH-1.6VKA2**	
	Power supply (phase, cycle, voltage)			Single, 50Hz, 220-240V	
		Input	kW	1.44	1.41
		Running current	A	6.74	6.60
		Starting current	A	33	
	External finish			Munsell 5Y 7/1	
	Refrigerant control			Capillary tube	
	Compressor			Hermetic	
		Model		RH247VFC	
		Motor output	kW	1.2	
		Starter type		Line start	
		Protection devices		Inner thermostat, High pressure switch	
	Heat exchanger			Plate fin coil	
		Fan(drive) x No.		Propeller (direct) x 1	
		Fan motor output	kW	0.065	
		Airflow	m³/min(CFM)	45(1,590)	
	Defrost method			Reverse cycle	
	Noise level		dB(A)	49	
	Dimensions	W	mm,(in.)	870(34-1/4)	
		D	mm,(in.)	295+24 (11-5/8 and 1)	
		H	mm,(in.)	650 (25-5/8)	
	Weight		kg,(lbs)	53(117)	
REFRIGERANT PIPING	Refrigerant			R-22	
	Charge		kg,(lbs)	2.2(4.8)	
	Pipe size O.D.	Liquid	mm,(in.)	9.52 (3/8)	
		Gas	mm,(in.)	15.88 (5/8)	
	Connection method	Indoor side		Flared	
		Outdoor side		Flared	
	Between the indoor & outdoor unit	Height difference		Max. 40m	
		Piping length		Max. 40m	

Item \ Service Ref.				PLH-2KKHC	
Function				Cooling	Heating
Capacity			Btu/h	18,400	19,800[24,600]
			W	5,400	5,800[7,200]
Total input			kW	2.34	2.32[4.09]
INDOOR UNIT	**Service Ref.**			**PLH-2KKHC**	
	Power supply(phase, cycle,voltage)			Single, 50Hz, 220-240V	
		Input	kW	0.14	0.10[1.50]
		Running current	A	0.65	0.45[6.28]
		Starting current	A	0.72	0.50[6.91]
	External finish			Galvanized sheets with gray heat insulation	
	Heat exchanger			Plate fin coil	
		Fan(drive) x No.		Turbo fan (direct) x 1	
		Fan motor output	kW	0.030	
		Airflow(Low-High)	m³/min(CFM)	13-16(460-565)	
		External static pressure	mmAq,Pa	0(direct blow)	
	Booster heater		kW	[1.4]	
	Operation control & Thermostat			Remote controller & built-in	
	Noise level(Low-High)		dB(A)	32-37	
	Cond. drain conn. O.D.		mm,(in.)	UNIT : 660(26) 32(1-1/4)	
	Dimensions	W	mm,(in.)	UNIT : 660(26)	PANEL : 760(30)
		D	mm,(in.)	UNIT : 253(10)	PANEL : 760(30)
		H	mm,(in.)	UNIT : 19(42)[20(44)]	PANEL : 30(1-1/8)
	Weight		kg,(lbs)		PANEL : 3.7(8)[3.7(8)]
OUTDOOR UNIT	**Service Ref.**			**PUH-2VKA2**	
	Power supply (phase, cycle, voltage)			2.20 Single, 50Hz, 220-240V	
		Input	kW	9.86	2.22
		Running current	A	45	9.95
		Starting current	A		45
	External finish			Munsell 5Y 7/1	
	Refrigerant control			Capillary tube	
	Compressor			Hermetic	
		Model		NH38VMD	
		Motor output	kW	1.7	
		Starter type		Line start	
		Protection devices		Inner thermostat, HP switch	
	Heat exchanger			Plate fin coil	
		Fan(drive) x No.		Propeller (direct) x 1	
		Fan motor output	kW	0.065	
		Airflow	m³/min(CFM)	45(1590)	
	Defrost method			Reverse cycle	
	Noise level		dB(A)	49	
	Dimensions	W	mm,(in.)	870(34-1/4)	
		D	mm,(in.)	295+24 (11-5/8 add 1)	
		H	mm,(in.)	650 (25-5/8)	
	Weight		kg,(lbs)	64(141)	
REFRIGERANT PIPING	Refrigerant			R-22	
	Charge		kg,(lbs)	2.2(4.8)	
	Pipe size O.D.	Liquid	mm,(in.)	9.52 (3/8)	
		Gas	mm,(in.)	15.88 (5/8)	
	Connection method	Indoor side		Flared	
		Outdoor side		Flared	
	Between the indoor & outdoor unit	Height difference		Max. 40m	
		Piping length		Max. 40m	

Item / Service Ref.				PLH-2.5KKHC	
Function				Cooling	Heating
Capacity			Btu/h	21,500	24,600[31,700]
			W	6,300	7,200[9,300]
Total input			kW	2.60	2.33[4.87]
INDOOR UNIT	**Service Ref.**			**PLH-2.5KKHC**	
	Power supply(phase, cycle,voltage)			Single, 50Hz, 220-240V	
		Input	kW	0.14	0.10[2.20]
		Running current	A	0.61	0.45[9.20]
		Starting current	A	0.67	0.50[10.12]
	External finish			Galvanized sheets with gray heat insulation	
	Heat exchanger			Plate fin coil	
		Fan(drive) x No.		Turbo fan (direct) x 1	
		Fan motor output	kW	0.030	
		Airflow(Low-High)	m³/min(CFM)	14-17(495-600)	
		External static pressure	mmAq,Pa	0(direct blow)	
	Booster heater		kW	[2.1]	
	Operation control & Thermostat			Remote controller & built-in	
	Noise level(Low-High)		dB(A)	35-39.5	
	Cond. drain conn. O.D.		mm,(in.)	32(1-1/4)	
	Dimensions	W	mm,(in.)	UNIT : 660(26)	PANEL : 760(30)
		D	mm,(in.)	UNIT : 660(26)	PANEL : 760(30)
		H	mm,(in.)	UNIT : 253(10)	PANEL : 30(1-1/8)
	Weight		kg,(lbs)	UNIT : 20(44)[21(46)]	PANEL : 3.7(8)[3.7(8)]
OUTDOOR UNIT				**PUH-2.5VKA2**	
	Service Ref.			Single, 50Hz, 220-240V	
	Power supply (phase, cycle, voltage)		kW	2.46	2.23
		Input	A	10.68	9.78
		Running current	A	52	52
		Starting current		Munsell 5Y 7/1	
	External finish			Capillary tube	
	Refrigerant control			Hermetic	
	Compressor			NH41VMD	
		Model	kW	2.0	
		Motor output		Line start	
		Starter type		Inner thermostat, HP switch	
		Protection devices		Plate fin coil	
	Heat exchanger			Propeller (direct) x 1	
		Fan(drive) x No.	kW	0.085	
		Fan motor output	m³/min(CFM)	50(1764)	
		Airflow		Reverse cycle	
	Defrost method		dB(A)	52	
	Noise level	W	mm,(in.)	870(34-1/4)	
		D	mm,(in.)	295+24 (11-5/8 add 1)	
	Dimensions	H	mm,(in.)	850(34-1/4)	
	Weight		kg,(lbs)	68(150)	
REFRIGERANT	Refrigerant			R-22	
	Charge		kg,(lbs)	2.8(6.2)	
	Pipe size O.D.	Liquid	mm,(in.)	9.52(3/8)	
		Gas	mm,(in.)	15.88 (5/8)	
	Connection method	Indoor side		Flared	
		Outdoor side		Flared	
	Between the indoor & outdoor unit	Height difference		Max. 50m	
		Piping length		Max. 50m	

4 DATA

1. PERFORMANCE DATA

1) COOLING CAPACITY

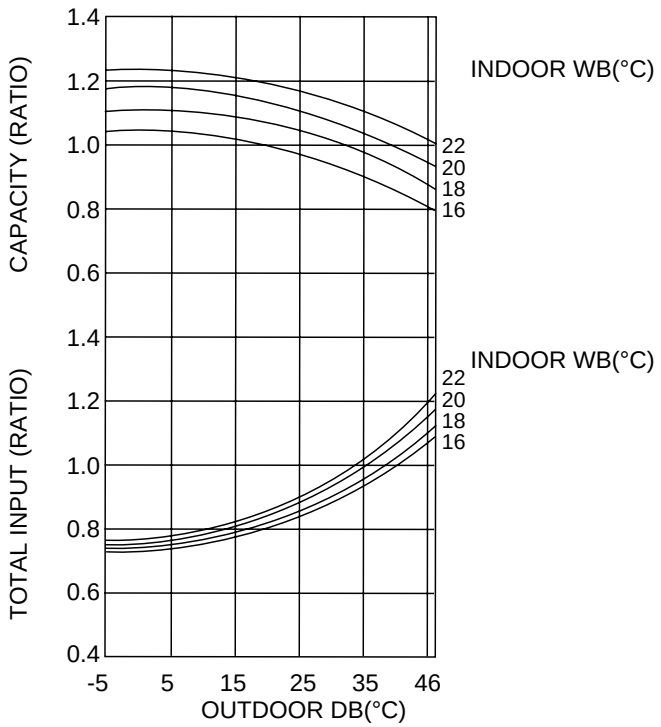
Service Ref.	Indoor intake air WB℃	Outdoor intake air DB℃											
		20		25		30		35		40		45	
		CA	P.C.	CA	P.C.	CA	P.C.	CA	P.C.	CA	P.C.	CA	P.C.
PLH-1.6KKHC	16	4,347	1.36	4,227	1.42	4,068	1.52	3,900	1.63	3,724	1.74	3,535	1.85
	18	4,627	1.39	4,506	1.44	4,339	1.56	4,162	1.67	3,978	1.78	3,788	1.90
	20	4,906	1.41	4,790	1.47	4,618	1.59	4,438	1.71	4,253	1.83	4,059	1.96
	22	5,177	1.43	5,078	1.50	4,906	1.62	4,730	1.75	4,545	1.89	4,352	2.03
PLH-2KKHC	16	5,257	2.14	5,112	2.23	4,919	2.40	4,716	2.57	4,503	2.74	4,274	2.91
	18	5,595	2.18	5,450	2.27	5,247	2.45	5,034	2.63	4,810	2.81	4,581	2.98
	20	5,933	2.22	5,793	2.31	5,585	2.50	5,366	2.69	5,143	2.89	4,909	3.08
	22	6,261	2.25	6,141	2.35	5,933	2.55	5,720	2.76	5,496	2.97	5,262	3.19
PLH-2.5KKHC	16	6,268	2.47	6,095	2.58	5,865	2.78	5,628	2.97	5,369	3.17	5,096	3.37
	18	6,671	2.53	6,498	2.63	6,256	2.84	6,002	3.05	5,735	3.25	5,462	3.46
	20	7,074	2.57	6,907	2.68	6,659	2.90	6,398	3.12	6,132	3.34	5,853	3.57
	22	7,465	2.61	7,322	2.73	7,074	2.96	6,820	3.19	6,553	3.44	6,274	3.70

Note CA:Capacity (W)
P.C. :Power consumption (kW)

Cooling capacity correction factors

Service Ref.	Refrigerant piping length (one way)									
	5m	10m	15m	20m	25m	30m	35m	40m	45m	50m
PLH-1.6KKHC	1.00	0.993	0.984	0.978	0.969	0.961	0.956	0.948	—	—
PLH-2KKHC	1.00	0.992	0.983	0.978	0.966	0.959	0.950	0.945	—	—
PLH-2.5KKHC	1.00	0.989	0.980	0.970	0.960	0.950	0.940	0.930	0.920	0.910

Cooling performance curve(50Hz)



2) HEATING CAPACITY

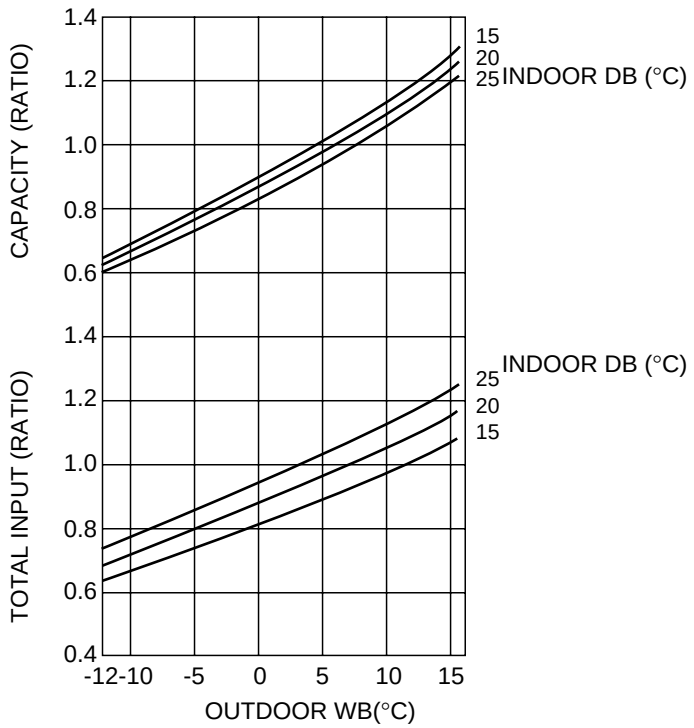
Service Ref.	Indoor intake air WB℃	Outdoor intake air DB℃											
		-10		15		0		5		10		15	
		CA	P.C.	CA	P.C.	CA	P.C.	CA	P.C.	CA	P.C.	CA	P.C.
PLH-1.6KKHC	15	3,169	1.12	3,625	1.23	4,126	1.36	4,669	1.49	5,249	1.62	5,874	1.77
	20	3,031	1.20	3,482	1.33	3,970	1.46	4,494	1.60	5,055	1.75	5,653	1.90
	25	2,916	1.28	3,340	1.42	3,813	1.56	4,329	1.71	4,885	1.87	5,488	2.04
PLH-2KKHC	15	3,996	1.77	4,570	1.95	5,203	2.15	5,887	2.35	6,618	2.57	7,407	2.80
	20	3,822	1.90	4,391	2.10	5,005	2.31	5,667	2.53	6,374	2.77	7,128	3.01
	25	3,677	2.02	4,211	2.24	4,808	2.47	5,458	2.71	6,160	2.97	6,919	3.23
PLH-2.5KKHC	15	4,616	1.82	5,280	2.01	6,010	2.21	6,801	2.43	7,645	2.65	8,556	2.88
	20	4,415	1.96	5,072	2.17	5,782	2.38	6,546	2.61	7,363	2.85	8,234	3.10
	25	4,248	2.09	4,864	2.31	5,554	2.55	6,305	2.80	7,115	3.06	7,993	3.33

Note CA:Capacity (W)
P.C. :Power consumption (kW)

Heating capacity correction factors

Service Ref.	Refrigerant piping length (one way)									
	5m	10m	15m	20m	25m	30m	35m	40m	45m	50m
PLH-1.6KKHC	1.00	1.00	1.00	1.00	1.00	1.00	0.998	0.995	—	—
PLH-2KKHC	1.00	1.00	1.00	1.00	1.00	1.00	0.998	0.995	—	—
PLH-2.5KKHC	1.00	1.00	1.00	1.00	1.00	1.00	0.998	0.995	0.993	0.990

Heating performance curve(50Hz)



2. ELECTRICAL DATA

Indoor unit … 220V 50Hz 1phase
Outdoor unit…220V 50Hz 1phase

Service Ref.	Indoor unit / Outdoor unit	PLH-1.6KKHC / PUH-1.6VKA2		PLH-2KKHC / PUH-2VKA2		PLH-2.5KKHC / PUH-2.5VKA2	
Mode		Cool	Heat	Cool	Heat	Cool	Heat
Capacity (W)		4,300	4,550 [5,720]	5,300	5,700 [6,870]	6,200	6,900 [8,660]
Total Input (kW)		1.48	1.40 [2.57]	2.24	2.22 [3.73]	2.53	2.25 [4.41]
Indoor unit	Input (kW)	0.12	0.08 [1.25]	0.12	0.08 [1.25]	0.12	0.09 [1.85]
	Current (A)	0.60	0.41 [5.75]	0.61	0.42 [5.76]	0.57	0.46 [9.28]
	Starting current (A)	0.66	0.45 [6.33]	0.67	0.46 [6.34]	0.63	0.80 [8.79]
Outdoor unit	Input (kW)	1.36	1.32	2.12	2.14	2.41	2.16
	Current (A)	6.79	6.59	9.83	9.93	11.18	10.02
	Starting current (A)	30	30	43	43	52	52

Indoor unit … 230V 50Hz 1phase
Outdoor unit…230V 50Hz 1phase

Service Ref.	Indoor unit / Outdoor unit	PLH-1.6KKHC / PUH-1.6VKA2		PLH-2KKHC / PUH-2VKA2		PLH-2.5KKHC / PUH-2.5VKA2	
Mode		Cool	Heat	Cool	Heat	Cool	Heat
Capacity (W)		4,350	4,600 [5,890]	5,350	5,750 [7,040]	6,250	7,050 [8,980]
Total Input (kW)		1.54	1.45 [3.01]	2.29	2.27 [3.92]	2.57	2.29 [4.64]
Indoor unit	Input (kW)	0.14	0.09 [1.38]	0.13	0.09 [1.38]	0.13	0.09 [2.02]
	Current (A)	0.62	0.43 [6.02]	0.63	0.44 [6.03]	0.59	0.43 [8.82]
	Starting current (A)	0.68	0.47 [6.62]	0.69	0.48 [6.63]	0.65	0.47 [9.70]
Outdoor unit	Input (kW)	1.40	1.36	2.16	2.18	2.44	2.20
	Current (A)	6.76	6.57	9.78	9.87	10.94	9.86
	Starting current (A)	32	32	44	44	52	52

Indoor unit … 240V 50Hz 1phase
Outdoor unit…240V 50Hz 1phase

Service Ref.	Indoor unit / Outdoor unit	PLH-1.6KKHC / PUH-1.6VKA2		PLH-2KKHC / PUH-2VKA2		PLH-2.5KKHC / PUH-2.5VKA2	
Mode		Cool	Heat	Cool	Heat	Cool	Heat
Capacity (W)		4,400	4,650 [6,050]	5,400	5,800 [7,200]	6,300	7,200 [9,300]
Total Input (kW)		1.59	1.51 [3.20]	2.34	2.32 [4.09]	2.60	2.33 [4.87]
Indoor unit	Input (kW)	0.15	0.10 [1.50]	0.14	0.10 [1.50]	0.14	0.10 [2.20]
	Current (A)	0.64	0.45 [6.28]	0.65	0.45 [6.28]	0.67	0.45 [9.20]
	Starting current (A)	0.70	0.50 [6.91]	0.72	0.50 [6.91]	0.67	0.80 [9.55]
Outdoor unit	Input (kW)	1.44	1.41	2.20	2.22	2.46	2.23
	Current (A)	6.74	6.60	9.86	9.95	10.68	9.78
	Starting current (A)	33	33	45	45	52	52

3. STANDARD OPERATION DATA

Service Ref.			PLH-1.6KKHC		PLH-2KKHC		PLH-2.5KKHC	
Mode			Cooling	Heating	Cooling	Heating	Cooling	Heating
Total	Capacity	W	4,400	4,650	5,400	5800	6,300	7,200
	Input	kW	1.59	1.51	2.34	2.32	2.60	2.33
Electrical circuit	**Indoor unit Service Ref.**		**PLH-1.6KKHC**		**PLH-2KKHC**		**PLH-2.5KKHC**	
	Phase,Hz		1,50		1,50		1,50	
	Volts	V	240		240		0.61 240	
	Amperes	A	0.64	0.45	0.65	0.45		0.45
	Outdoor unit Service Ref.		**PUH-1.6VKA2**		**PUH-2VKA2**		**PUH-2.5VKA2**	
	Phase,Hz		1,50		1,50		1,50	
	Volts	V	240		240		240	
	Amperes	A	6.74	6.60	9.86	9.95	10.68	9.78
Refrigetrant circuit	Discharge pressure	Mpa•G (kgf/m²•G)	1.80 (18.3)	1.70 (17.3)	1.90 (19.3)	1.94 (19.8)	1.95 (19.9)	1.71 (17.4)
	Suction pressure	Mpa•G (kgf/m²•G)	0.54 (5.5)	0.40 (4.1)	0.46 (4.7)	0.34 (3.5)	0.50 (5.1)	0.36 (3.7)
	Discahrge temperature	°C	78.7	77.2	84.0	86.4	82.8	76.0
	Condensing temperature	°C	48.5	—	50.7	—	51.8	—
	Suction temperature	°C	8.5	0.7	4.8	-1.8	6.7	-1.5
	Ref. pipe length	m	5	5	5	5	5	5
Indoor side	Intake air temperature	DB°C	27	20	27	20	27	20
		WB°C	19	15	19	15	19	15
	Discharge air temperature	DB°C	16.1	35.2	15.0	39.4	13.8	41.2
Outdoor side	Intake air temperature	DB°C	35	7	35	7	35	7
		WB°C	24	6	24	6	24	6
SHF			0.83	—	0.76	—	0.75	—
BF			0.21	—	0.21	—	0.14	—

The unit of pressure has been changed to Mpa based on international SI system.

The conversion factor is : 1(Mpa·G)=10.2(kgf/㎠·G)

4. OUTLET AIR SPEED AND COVERAGE RANGE

			PLH-1.6KKHC	PLH-2KKHC	PLH-2.5KKHC
Standard	Air flow	m³/min	16.0	16.0	17.0
	Air speed	m/sec.	5.6	5.6	5.9
	Coverage range	m	6.0	6.0	6.4
High ceiling	Air flow	m³/min	17.0	17.0	18.0
	Air speed	m/sec.	5.9	5.9	6.3
	Coverage range	m	6.4	6.4	6.8
	Total width of discharge outlets	mm	0	0	0

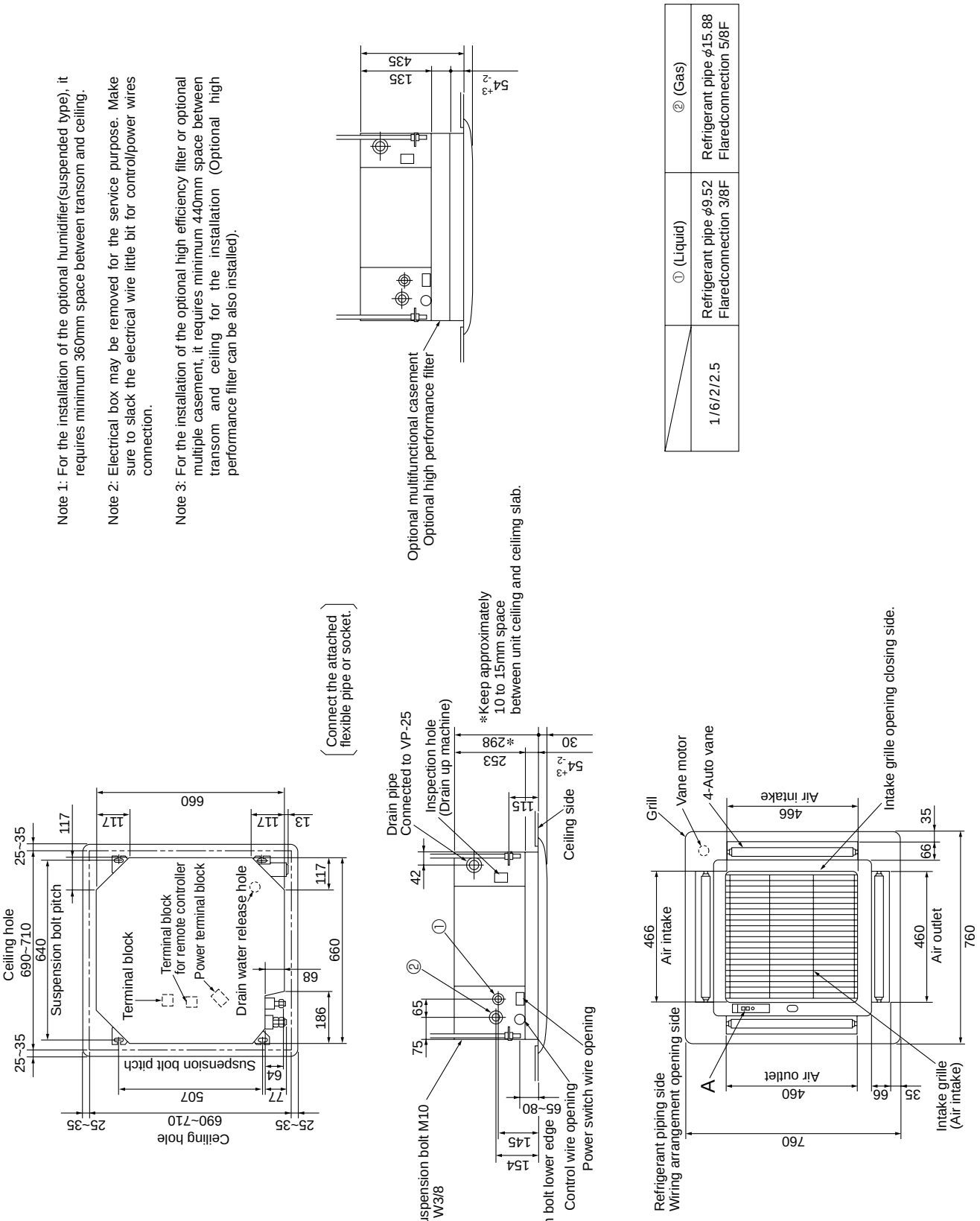
※ The air coverage range is the value up to the position where the air speed is 0.25m/sec.
When air is blown out horizontally from the unit at the Hi notch position.
The coverage range should be used only as a general guideline since it varies according to the size of the room and the furniture inside the room.

5 OUTLINES AND DIMENSIONS

1. INDOOR UNIT

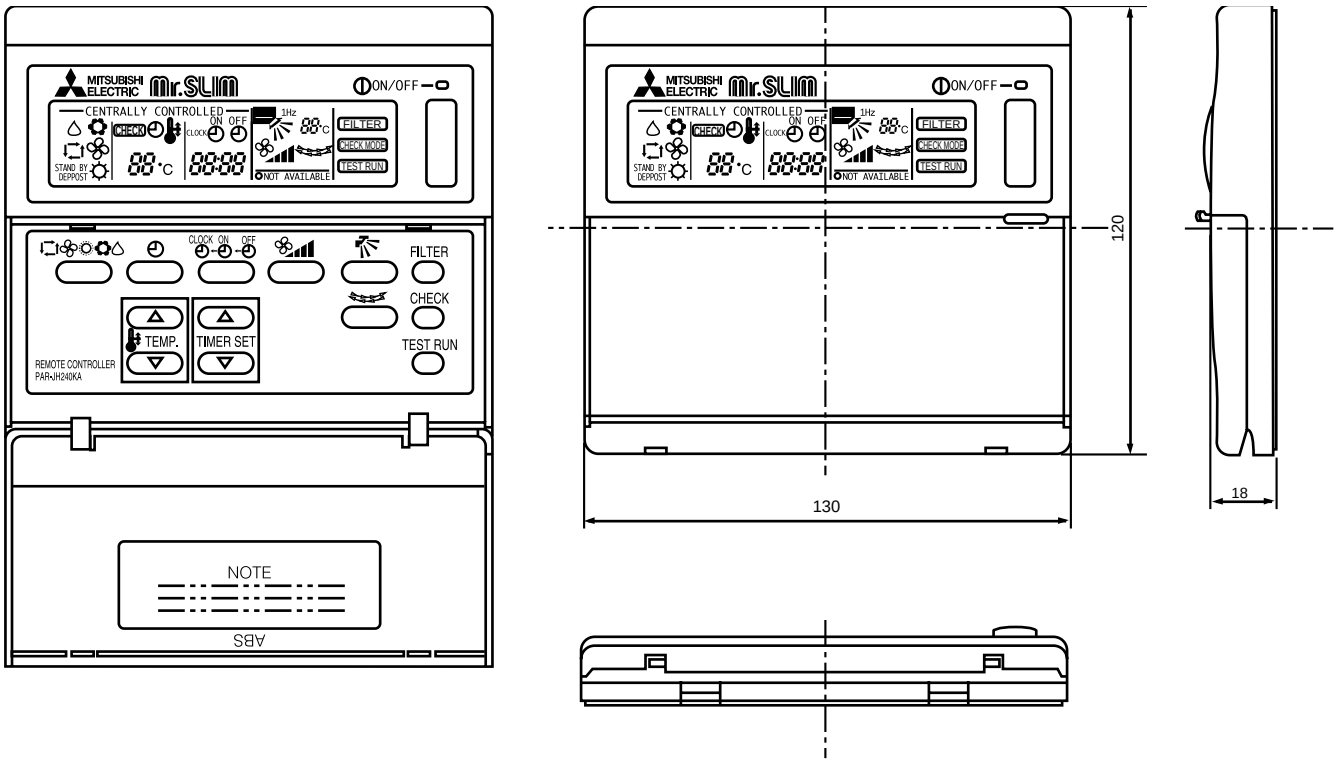
Unit : mm

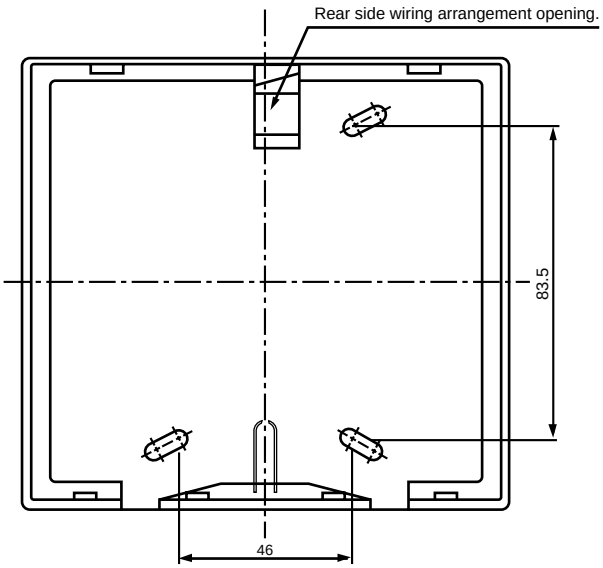
PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC

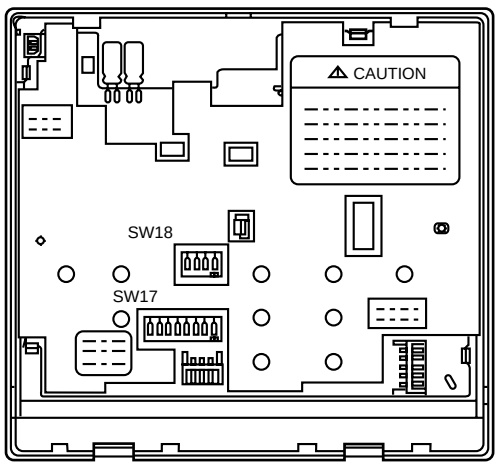


2.REMOTE CONTROLLER

Unit : mm (inch)



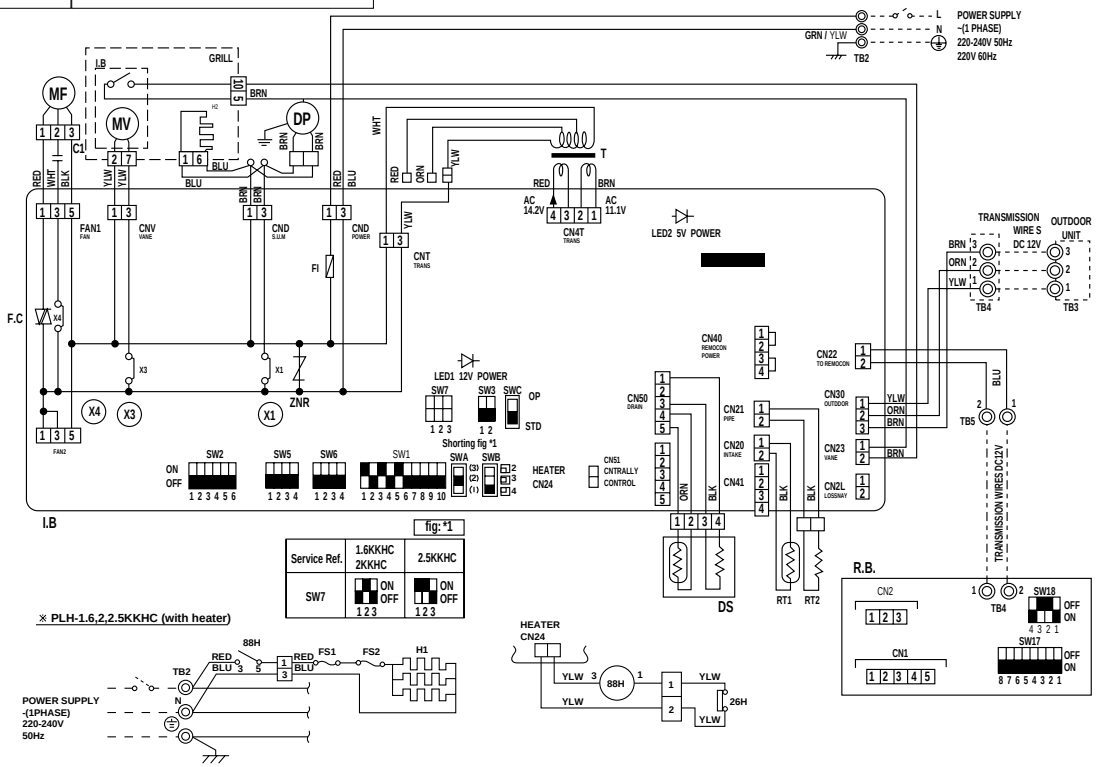




6 WIRING DIAGRAM

PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
R.B	REMOTE CONTROLLER BOARD	CN2L<I.B>	LOSSNAY CONNECTOR	X3<I.B>	VANE MOTOR RELAY
SW17<R.B>	ADDRESS SELECTOR	CN51<I.B>	CENTRALLY CONTROL CONNECTOR	X4<I.B>	FAN MOTOR RELAY
SW18<R.B>	FUNCTION SELECTOR	FAN2<I.B>	EMERGENCY OPERATION CONNECTOR	F1<I.B>	FUSE(6.3A)
CN1<R.B>	PROGRAM TIMER CONNECTOR	F.C<I.B>	FAN PHASE CONTROL	LED1<I.B>	DC 12V POWER LED
CN2<R.B>	REMOTE SWITCH CONNECTOR	SW1<I.B>	MODE SELECTOR	LED2<I.B>	DC 5V POWER LED
MV	VANE MOTOR	SW2<I.B>	ADDRESS SELECTOR	CNP<I.B>	DRAIN PUMP CONNECTOR
LS	LIMIT SWITCH	SW3<I.B>	EMERGENCY OPERATION SWITCH	CN50<I.B>	DRAIN SENSOR CONNECTOR
H2	DEW PREVENTION HEATER	SW5, SW7<I.B>	MODEL SELECTOR	DP	DRAIN PUMP
RT1	ROOM TEMP. THERMISTOR(0°C/15KΩ,25°C5.4KΩ)	SW6<I.B>	TWIN, TRIPLE SWITCH	DS	DRAIN SENSOR
RT2	INDOOR COIL THERMISTOR(0°C/15KΩ,25°C5.4KΩ)	SWA<I.B>	HIGH SEILING, NOISE SAVING SELECTOR	H1	HEATER
T	TRANSFORMER	SWB<I.B>	NUMBER OF AIR OUTLETS SELECTOR	FS1,2	THERMAL FUSE
MF	INNER THERMOSTAT FAN MOTOR	SWC<I.B>	OPTION SELECTOR	26H	HEATER THERMAL SWITCH
C1	FAN MOTOR CAPACITOR	ZNR<I.B>	VARISTOR	88H	HEATER CONNECTOR
TB2~6	TERMINAL BLOCK	X1<I.B>	DRAIN PUMP/D.HEATER RELAY	CNV<I.B>	VANE MOTOR CONNECTOR
I.B	INDOOR CONTROLLER BOARD				



NOTES :

1. Since the indoor transformer (T)is connected with 240Vpower. If 220, 230v power is used. change the wiring connection showing fig: ※2

fig:※2

When power supply is

230V	240V	YELLOW
220V	230V	ORANGE
	220V	RED

2. Since the outdoor side electric wiring may change be sure to check the outdoor unit electric wiring for servicing.
3. Indoor and outdoor connecting wires are made with polarities. make wiring matching terminal numbers.
4. Symbols used in wiring diagram above are. ◎ : Terminal block, □□□□ : Connector.
5. Emergency operation
   If remote controller or microcomputer fails but there is no other truble,. emergency operation is possible by setting dip switch (SW3<I.B>) on the indoor controller board.

[Check items]

(1)Make sure that no other trouble exists the outdoor unit. Trouble with the outdoor unit prevents emergency operation.
   (If any trouble exists the outdoor unit error code “P8”will be displayed on the remote controller and the trouble position will be shown on the outdoor controller board LED. See electric wiring diagram of the outdoor unit for details.)
(2)Make sure that there is no trouble with the indoor fan.
   Emergency operation will be continuous run with the power ON/OFF (ON/OFF with the remote controller is not possible).

[Emergency operation procedure]

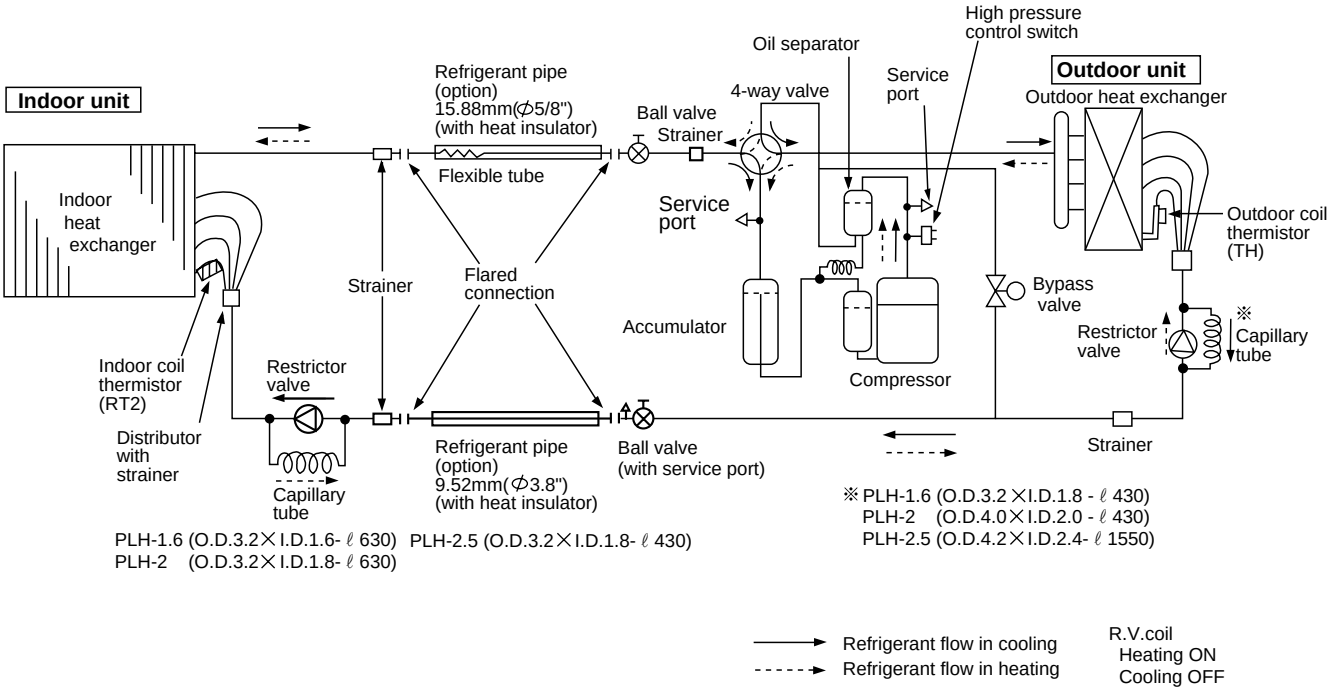
(1)Switch the fan connector on the indoor controller board from FAN 1 to FAN 2.
(2)Set the dip switch (SW3<I.B>) on the indoor controller board to 1 on and 2 off for cooling and 1 - 2 on for heating.
(3)Turn on the outdoor unit side circuit breaker, then the indoor unit side circuit breaker.
(4)During emergency operation indoor fan runs at High speed but auto-vane does not work.
(5)Thermostat will not function. Cold air blows out for defrosting during heating thus do not operate defrosting for a long time.
(6)Emergency cooling should be limited to 10 hours maximum. (the indoor unit heat exchanger may freeze).
(7)After every operation, switch the fan connector to FAN1, and set all dip switches (SW3<I.B>) to OFF.

NOTE: If the drain water lift up mechanism is identified to be defective with the microcomputer doctor during cooling, do not use emergency operation (it causes drain overflow)

7 REFRIGERANT SYSTEM DIAGRAM

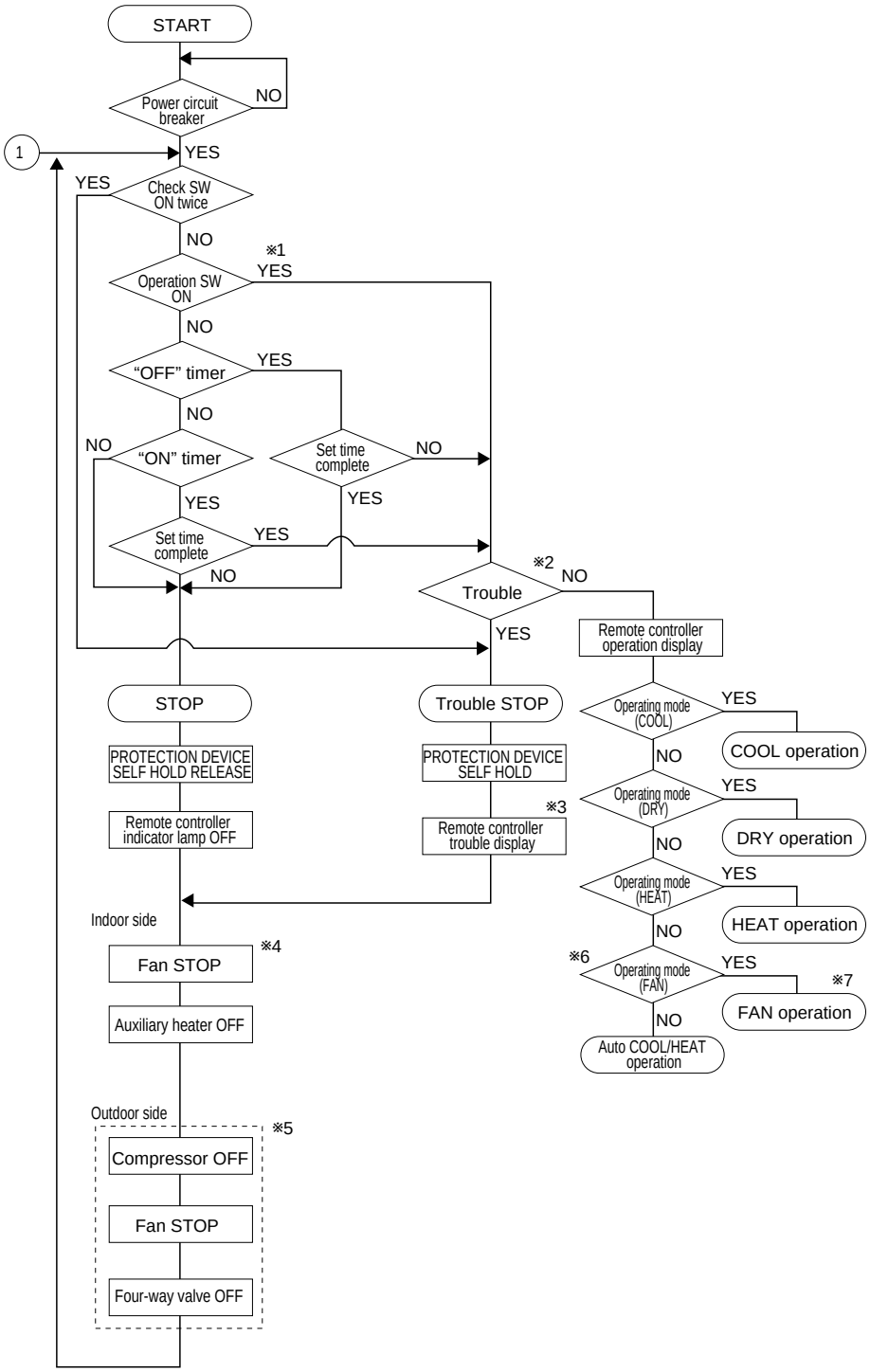
PLH-1.6KKHC/PUH-1.6VKA2
PLH-2KKHC/PUH-2VKA2
PLH-2.5KKHC/PUH-2.5VKA2

Unit : mm



8 OPERATION FLOW-CHART

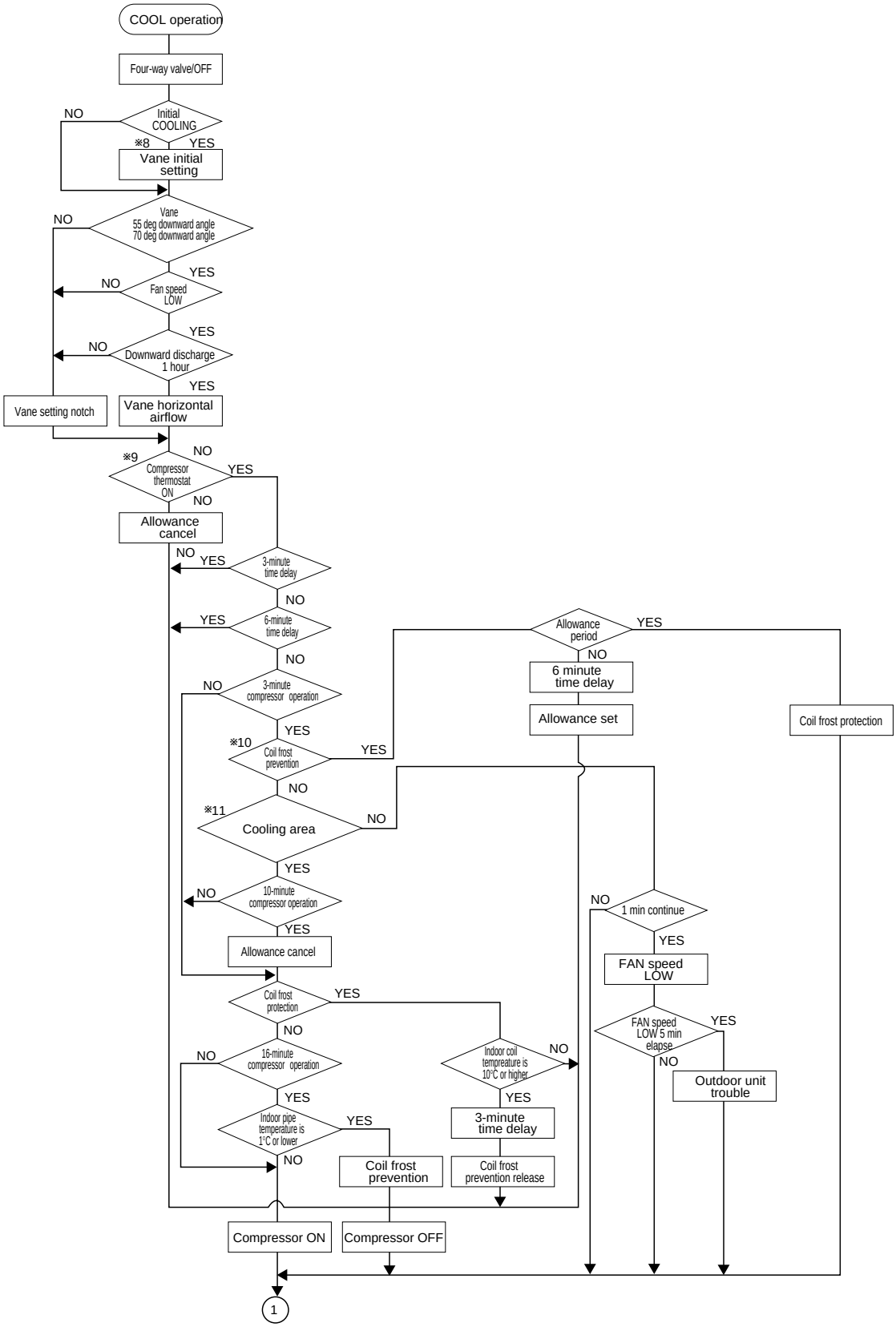
MAIN OPERATION



※1 In addition, the centralized control and remote control can be operated.
※2 The modes which indicate the sources of trouble are listed below.
- EO-Signal transmitting/receiving error
- P1-Room temperature thermistor malfunction
- P2-Indoor coil thermistor malfunction
- P4-Drain sensor malfunction
- P5-Drain overflow
- P6-Coil frost/overheat protection
- P7-System error
- P8-Outdoor unit trouble

※3 The CHECK swich will show if an error has occurred in the past.
※4 Fan runs on low speed for 1 minute in order to remove overheat air.
※5 The 3-minute (6 minutes ··· heating mode) time-delay functions after compressor stops.
※6 FAN or AUTO mode is selected by the indoor dipswitch setting.
※7 In FAN mode, fan speed and vane operation depend on the remote controller setting. (Compressor is OFF.)

COOLING OPERATION



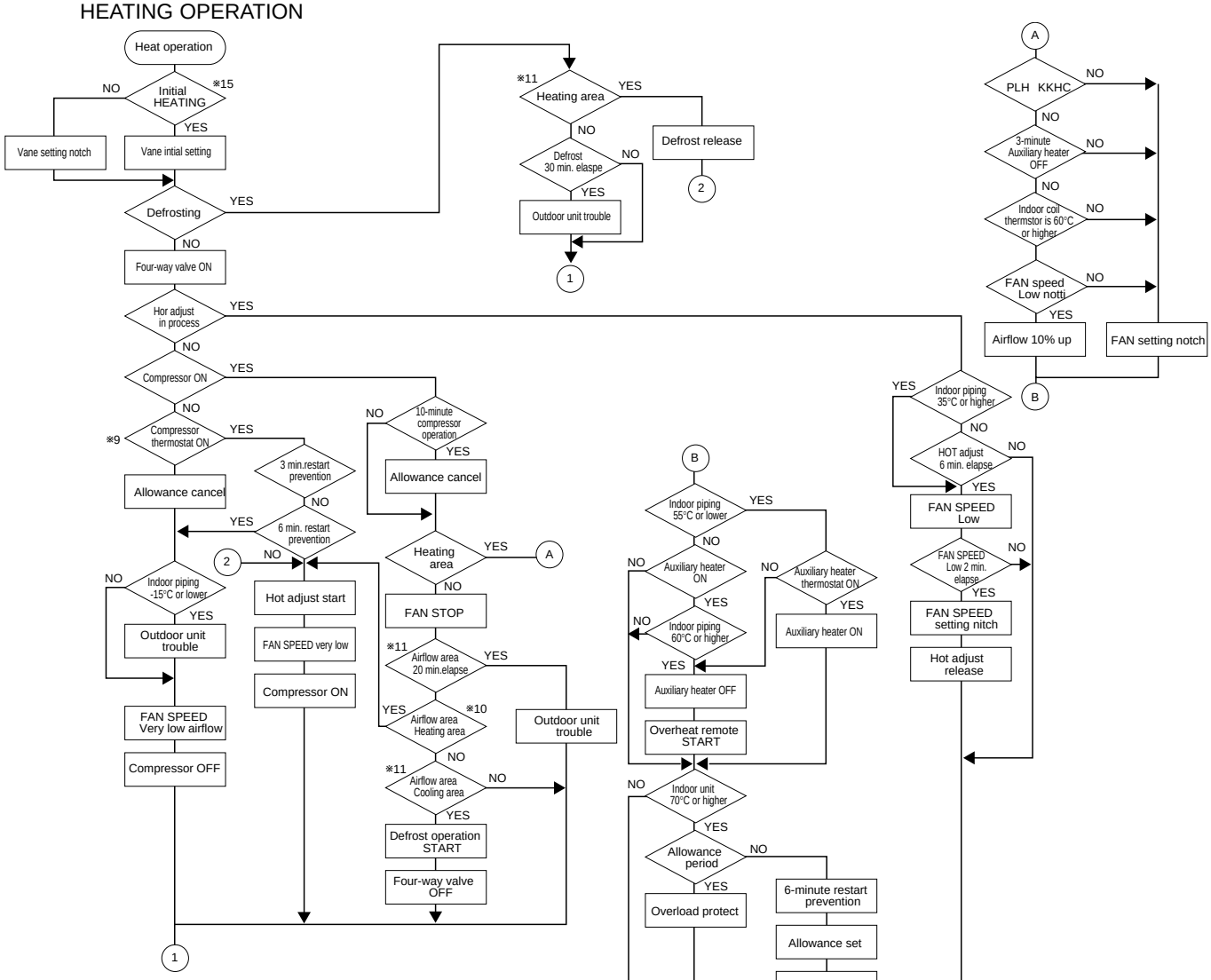
※8 When operation stops or changes to cooling or dry mode, the auto vane tums to a horizontal angle. If operation changes during auto vane SWING, the auto vane will continue to swing.

※9 When operating TEST RUN, the thermostat will be continuously ON.

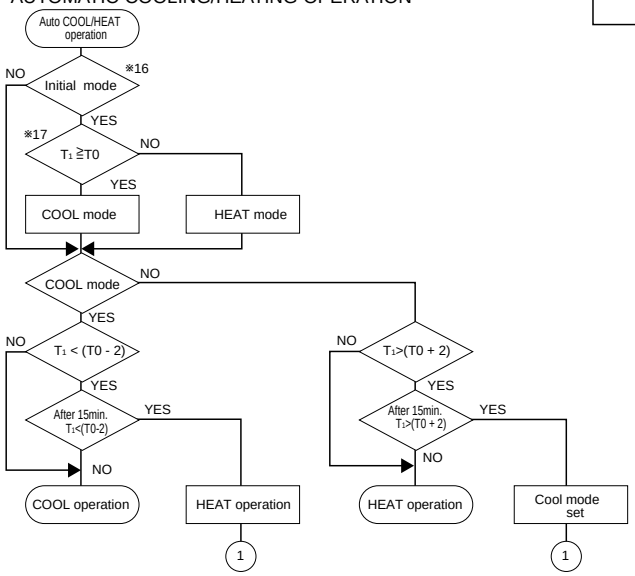
※10 After 3 minute compressor operation, if the indoor coil thermistor reads -15°C or below for 3 minutes, the compressor will stop for 6 minutes.

※11 Cooling area : Indoor coil temperature is more than 5 degrees above the room temperature.
Heating area : Indoor coil temperature is more than 5 degrees below the room temperature.
FAN area : Indoor coil temperature is within 5 degrees either way of the room temperature.

HEATING OPERATION

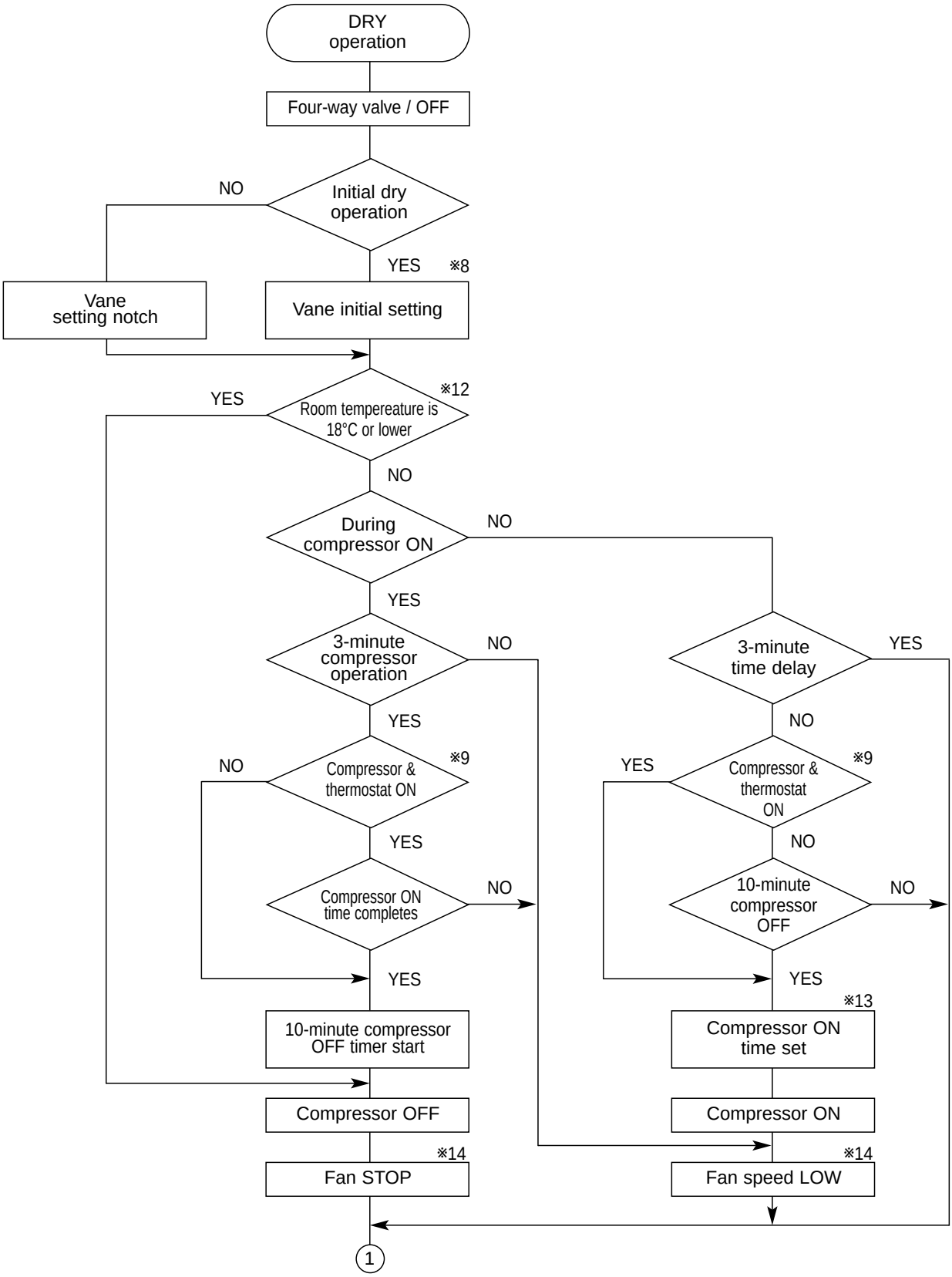


AUTOMATIC COOLING/HEATING OPERATION



※15 (i) Until Low airflow is set while hot adjustment
(ii)While defrosting (FAN STOP)
(iii)When thermostat is OFF
In the case of(i), (ii) and (iii) above, airflow is horizontal regardless the VANE setting.
※16 When AUTO operation is started, COOL or HEAT mode is selected automatically.
※17 T1 : Room temperature.
To : Set temperature

DRY OPERATION



※8—9 Refer to page 26~27.

※12 When room temperature is 18°C or below, the compressor cannot operate.
When room temperature rises over 18°C, the compressor starts after a 3-minute time delay.

※13 Compressor ON time is decided by room temperature. Refer to page 26~27.

※14 In dry operation, compressor ON makes the fan speed LOW and compressor OFF stops the fan.
It is not possible to set the fan speed with the remote controller

9 MICROPROCESSOR CONTROL

1.OUTLINE OF MICROPROCESSOR CONTROL

INPUT to remore controller

- OFF-ON switching.
- COOL/DRY-AUTO-HEAT selector switching.
- Thermostat setting.
- TIMER mode selector-switching and Timer setting.
- HIGH-LOW fan speed switching.
- AUTO Vane selector (AIR DISCHARGE) switching.
- TEST RUN switching.
- CHECK mode switching. (Self diagnostic trouble shooting)

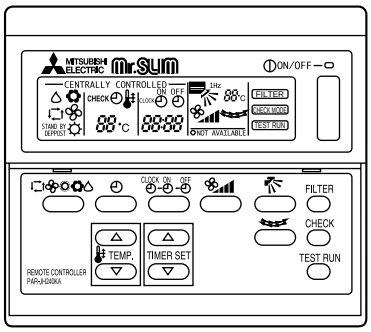
Remote controller board

- Processes and transmits orders.orders.

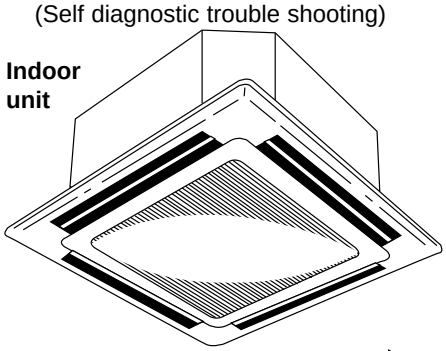
OUTPUT to remote controller

Remote controller

- LCD indicator



Indoor unit



Non-polar, two-wire cable
maxinmum length 500 meters

Signal

12VDC

INPUT from indoor unit

- Room temperature thermistor (RT1)
- Indoor coil thermistor (RT2)
- Drain sensor

Indoor controller board

- Receives orders from remote controller and temperature data from indoor unit.
- Processes orders and data.
- Controls indoor and outdoor operation.
- Self diagnostic function.

※ System control operation.
※ Emergency operation.
※ Set by dipswitch on indoor controller board.

- Transmits the power to remote controller.

OUTPUT to indoor unit

- Autovane's angle setting.
- Booster heater ON-OFF Control.
- Drain pump : ON-OFF.
- Emergency stop.

1 2 3

Polar three-wire cable

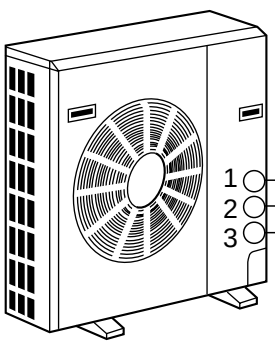
OUTPUT to outdoor unit

- Compressor and outdoor fan : ON-OFF
- Operation mode change :COOL-HEAT.

Independent Control of Outdoor Unit

- Compressor protection-device working
- Defrosting START-STOP
- Fan speed control.
- Crankcase heater control ON-OFF.
- Self diagnostic function

Outdoor unit

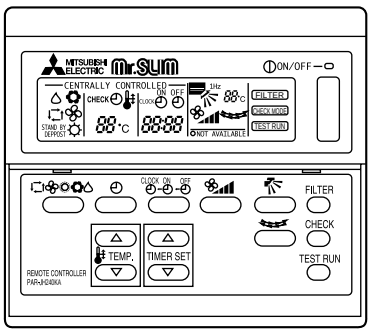


12VDC

1
2
3

2. INDOOR UNIT CONTROL

2-1COOL operation



<How to operate>

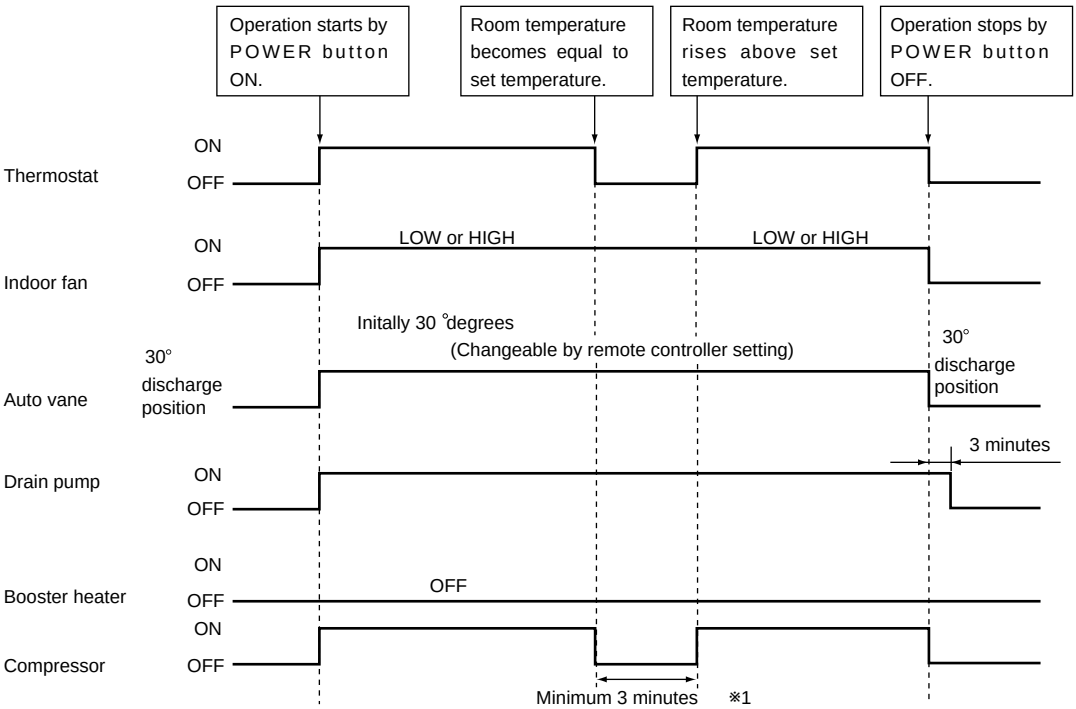
① Press POWER ON/OFF button.

②Press the ↕❀☼✿△ button to display "✿".

③Press the TEMP button to set the desired temperature.

NOTE: Set temperature changes 1°C when the △ or ▽ button is pressed one time.

<COOL operation time chart>



※1 Even if the room temperature rise above the set temperature during this period, the compressor will not start until this period has ended.

(1) Compressor control

① 3-minute time delay
To prevent overload, the compressor will not start within 3 minutes after stop.

② The compressor runs when room temperature is higher than set temperature.
The compressor stops when room temperature is equal to or lower than the set temperature.

③ The compressor stops in check mode or during protective functions.

④ Coil frost prevention
To prevent indoor coil frost, the compressor will stop when the indoor coil thermistor (RT2) reads 1°C or below after the compressor has been continuously operated for at least 16 minutes or more. When the indoor coil temperature rises to 10°C or above, the compressor will start after a 3-minute time delay.

NOTE : By turning OFF the dipswitch SW1-5 on indoor controller board, the start temperature of coil frost prevention changes from 1°C to -3°C.

⑤ Coil frost protection

When indoor coil temperatuer becomes -15°C or below, coil frost protection will proceed as follows.

<Start condition>

After the compressor has been continuously operated for 3 minutes or more,and the indoor coil temperature has been -15° or below for 3 minutes,the coil frost protection will start.

<Coil frost protection>

Compressor stops for 6 minutes,and then restarts.

If the start condition is satisfied again during the first 10 minutes of compressor operation, both the indoor and outdoor units stop, displaying a check code of“P8”on the remote controller.

<Termination conditions>

Coil frost protection is released when the start condition is not satisfied again during the allowance, or when the COOL mode stops or changes to another mode.

(2) Indoor fan control

Indoor fan speed LOW/HIGH depends on the remote controller setting.

However, if an outdoor unit abnormality is detected, the indoor fan speed will be LOW, regardless of the remote controller setting.

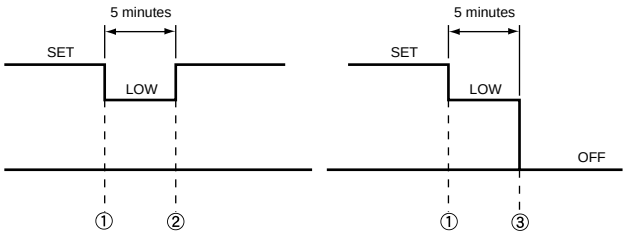
When the outdoor unit abnormality detection is released and the fan speed returns to the set speed, the quiet cycle control will work.

(a) Normal control

(i) Fan speed LOW/HIGH depends on the remote controller setting regardless of the thermostat ON/OFF.

(ii) Fan speed will remain on LOW if an abnormality in outdoor unit is detected. (5 minutes)

When the abnormality detection is released, the fan speed returns to the set speed.



① Start-up of outdoor unit abnormality detection.

② Release of outdoor unit abnormality detection.

③ Unit stop due to outdoor unit abnormality with P8 indication.

NOTE 1 : Fan stops immediately if the unit stops or the check mode is started.

(3) Auto vane control

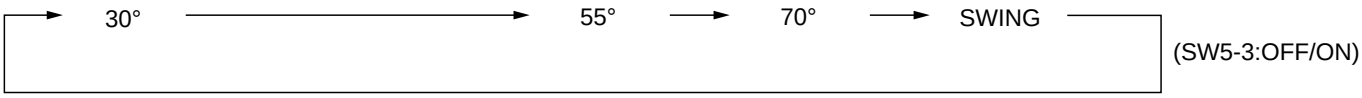
Auto vane position is set to 30degrees airflow at the start-up of COOL operation. It can then be changed by the remote controller.

(a) Stop mode (fixed operation)

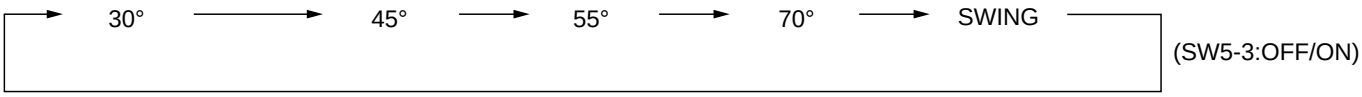
(i) At start-up of COOL operation, the auto vane is set to 10 degrees airflow direction.

(ii) Airflow direction can be changed with botton.

① Fan speed : LOW



② Fan speed : HIGH

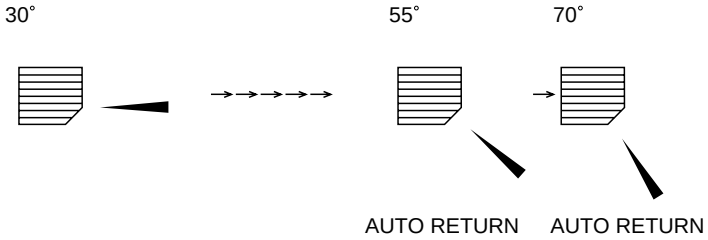


(b) SWING mode

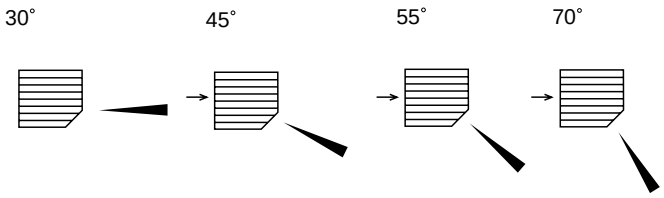
(i) The vane motor turns ON when the SWING mode is selected.
The vane motor is continuously ON during SWING mode.

<AUTO RETURN>

① Fan speed : LOW



②Fan speed : HIGH



When 55 degrees or 70 degrees airflow discharge is selected with the LOW fan speed in COOL operation, “AUTO RETURN” will appear below the temperature display. One hour later, the airflow direction returns to 30 degrees automatically and “AUTO RETURN” will disappear. If the airflow direction is set to 30 degrees during “AUTO RETURN” indication, the time counting for AUTO RETURN is cancelled.

<Auto vane drive>
(a) The auto vane is driven by a 2.5 rpm motor.
(b) Airflow direction can be selected between the No.1 and No.2 setting. (Initial setting is No.1)

①	②	③	④
30°	45°	55°	70°

(c) Vane motor drive time

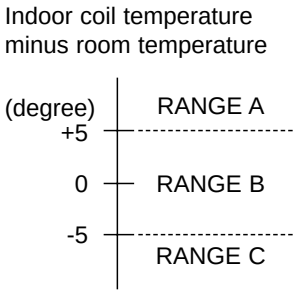
Unit : sec

Airflow direction change	50Hz
Downward C → Horizontal ④→①	Rise
Horizontal → Downward A ①→②	2.4
Downward A → Downward B ②→③	1.3
Downward B → Downward C ③→④	2.3

(d) Airflow direction is based on the horizontal position detected by the vane motor limit switch. When the horizontal position can not be determined, the vane motor will remain ON until it is determined.
① If the horizontal position still can not be detected, despite the 10minute detection, the vane motor will turn OFF. Remote controller indication continues.
② After, if the vane motor receives the “auto vane ON” command again, it will restart detecting the horizontal position. If the horizontal position still can not be determined, despite the 10-minute detection, the vane motor will turn OFF.

(4) Detecting abnormalities in the outdoor unit

After the compressor has been continuously operated for 3 minutes, if the difference between the indoor coil temperature and room temperature is out of RANGE C for 1 minute, the indoor fan speed will turn to LOW. Five minutes later, if the difference is still out of RANGE C,the outdoor unit is functioning abnormally. Thus, the compressor stops and check code “P8” appears on remote controler.
RANGE A : Indoor coil temperature is more than 5 degrees above room temperature.
RANGE B : Indoor coil temperature is within 5 degrees either way of room temperature.
RANGE C : Indoor coil temperature is more than 5 degrees below room tempetature.



(5) Drain pump control

The drain pump works in COOL or DRY operation. When operation stops or changes to HEAT mode, the drain pump continues to operate for 3 more minutes. The drain pump does not work in check mode.

<Drain sensor>

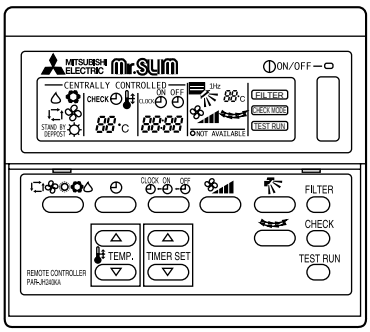
When both the drain pump and unit are operating, the drain sensor detects the temperature. This temperature tells whether the drain water level is above or under the drain sensor. If the drain water level rises above the drain sensor due to a drain pump malfunction, the unit will stop operating in order to prevent drain from overflowing. The check code “P5” on the remote controller will display this occurrence. When both of the following conditions are satisfied, the drain sensor is determined to be under water.

- Though the drain sensor has been heated by the drain sensor heater for more than 40 seconds, its temperature rise is less than 20 degrees.
- The drain sensor temperature is below 63°C.

(6) Dew prevention heater

To prevent dew from accumulating on the grill, the dew prevention heater is continuously ON during COOL operation. It is independant of the thermostat ON/OFF

2-2 DRY operation



<How to operate>

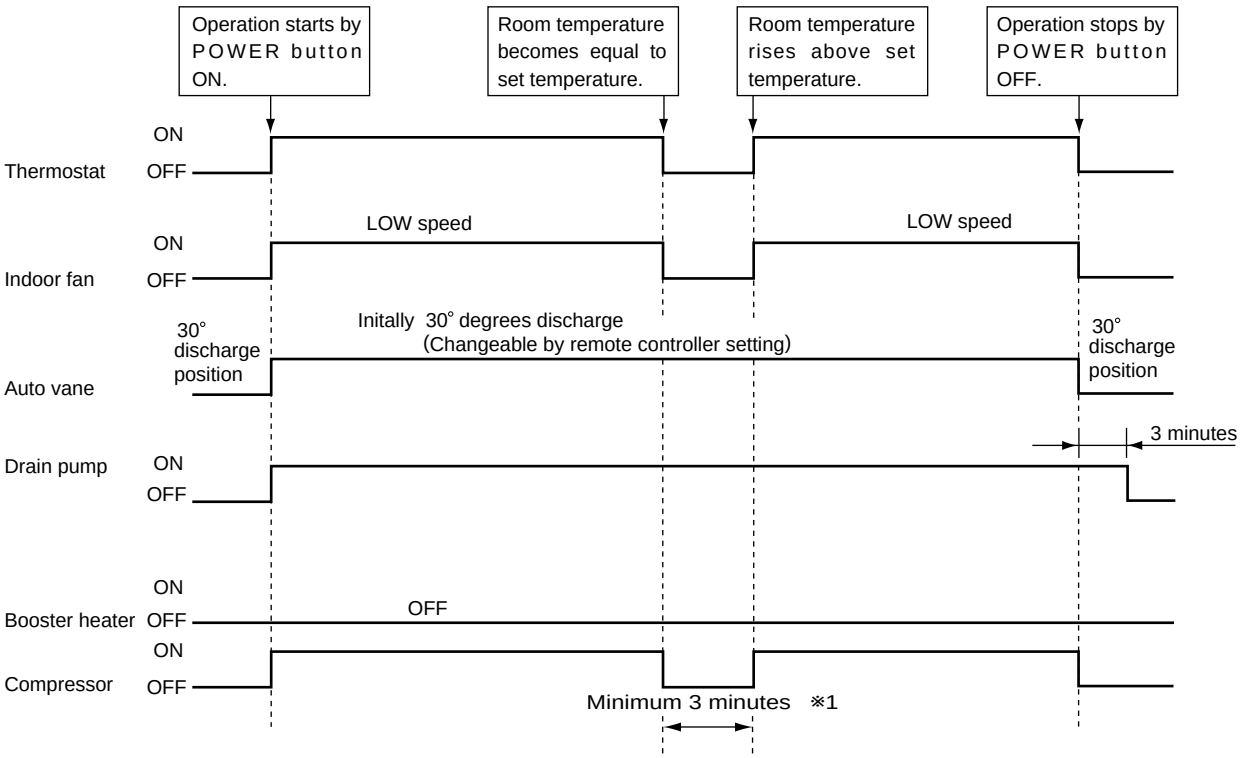
① Press POWER ON/OFF button.

② Press the ⟳ button to display "△"

③ Press the TEMP button to set the desired temperature.

NOTE: The set temperature changes 1°C when the △ or ▽ button is pressed one time.
Dry 19 to 30°C

<DRY operation time chart>



※1 Even if the room temperature rise above the set temperature during this period, the compressor will not start until this period has ended.

(1) Compressor control

①3-minute time delay
To prevent overload, the compressor will not start within 3 minutes after stop.

②The compressor runs when the room temperature is higher than the set temperature.
The compressor stops when the room temperature is equal to or lower than the set temperature.

③The compressor stops in check mode or during protective functions.

④The compressor will not start when the room temperature is below 18°C.
The compressor starts intermittent operation when the power is turned ON with room temperature above 18°C. The compressor ON/OFF time depends on the thermostat ON/OFF and the following room temperatures.After 3-minute compressor operation,

- If the room temperature thermistor reads above 28°C with thermostat ON, the compressor will operate for 6 more minutes and then stop for 3 minutes.
- If the room temperature thermistor reads 26°C~28°C with thermostat ON, the compressor will operate for 4 more minutes and then stop for 3 minutes.
- If the room themperature thermistor reads 24°C~26°C with thermostat ON, the compressor will operate for 2 more minutes and then stop for 3 minutes.
- If the room temperature thermistor reads below 24°C with thermostat ON, the compressor will stop for 3 minutes.
- If the thermostat is OFF regardless of room temperature, the compressor will stop for 10 minutes.

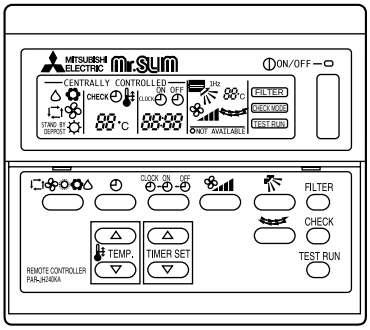
⑤Coil frost protection
Coil frost protection in DRY operation is the same as in COOL operation.
⑥Coil frost prevention
Coil frost prevention does not operate in DRY operation.

(2) Indoor fan control
The indoor fan runs on LOW speed during compressor operation. The fan speed cannot be changed with the remote controller. Also, the indoor fan does not run during compressor OFF.

(3) Auto vane & drain pump controls
Same as in COOL operation.

(4) Detecting abnormalities in the outdoor unit
An abnormality in the outdoor unit can not be detected in DRY operation.

2-3 HEAT operation



<How to operate>

① Press POWER ON/OFF button.

② Press the button to display "☼".

③ Press the TEMP button to set the desired temperature.

NOTE: The set temperature changes 1°C when the △ or ▽ button is pressed one time.
Heat 17 to 28°C

<Display in HEAT operation>

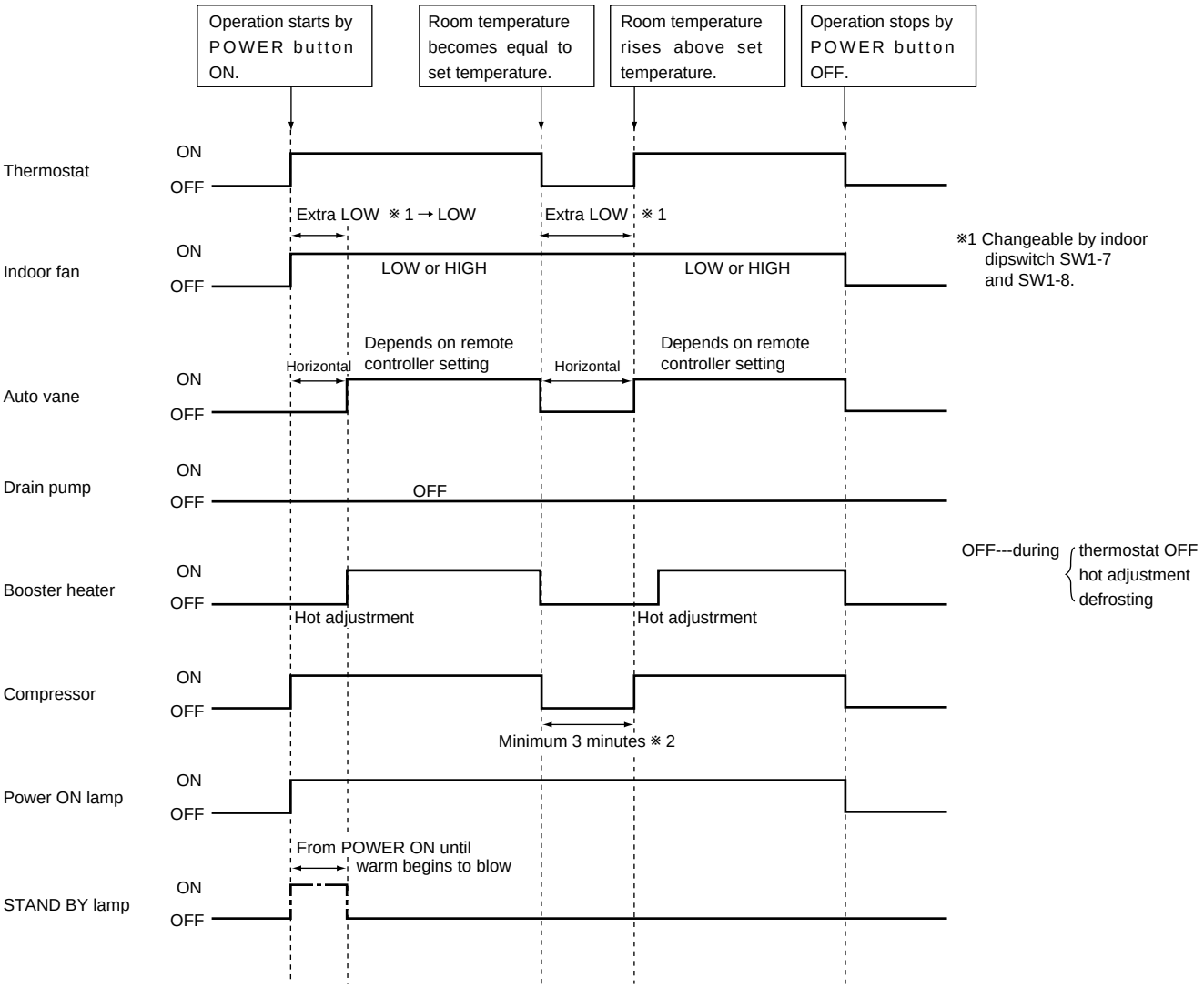
[DEFROST]

The [DEFROST] symbol is displayed during the defrost operation.

[STAND BY]

The [STAND BY] symbol is displayed from the time the heating operation starts until the heated air begins to blow.

<HEAT operation time chart>



※2 Even if the room temperature falls below the set temperature during this period, the compressor will not start until this period has ended.

(1) Compressor control

①3-minute time delay

To prevent overload, the compressor will not start within 3 minutes after stop.

②The compressor runs when the room temperature is lower than the set temperature.

The compressor stops when the room temperature is equal to or higher than the set temperature.

③The compressor stops in check mode or during protective functions.

④Overheat protection

<Start condition>

When the indoor coil thermistor reads 70°C or above, the overheat protection will start.

<Overheat protection>

The compressor stops for 6 minutes, and then restarts.

If the start condition is satisfied again within 10 minutes of compressor operation, both the indoor and outdoor units stop, displaying a check code of “P6” on the remote controller.

<Termination conditions>

Overheat protection is terminated when the start condition is not satisfied again during the allowance (10-minute compressor operation), when operation mode changes to other mode, or when thermostat turns OFF.

(2) Indoor fan control

(a) Normal control

(i)The indoor fan runs on EXTRA-LOW speed during the thermostat OFF.

EXTRA-LOW speed can be changed to LOW or HIGH speed by setting the dipswitch SW1-7 and SW1-8, If the indoor coil temperature becomes more than 5 degrees below the room temperature during the thermostat OFF, the indoor fan will stop. After, when the indoor coil temperature becomes within 5 degrees of room temperature, the indoor fan will run on EXTRA-LOW speed.

(ii)Hot adjustment

Hot adjustment is a warm-up for HEAT operation

<Start conditions>

The hot adjustment works under any of the follwing conditions.

- HEAT operation starts.
- Defrosting ends.
- Thermostat turns ON.

<Hot adjustment>

Initially, the indoor fan runs on EXTRA-LOW speed. When 5 minutes have passed or the indoor coil temperature exceeds 35°C, the fan speed changes to LOW. Two minutes later, the hot adjustment ends. Then, the fan speed depends on the remote controller setting.

(iii)The indoor fan stops when the indoor coil temperature is within 5 degrees either way of room temperature.

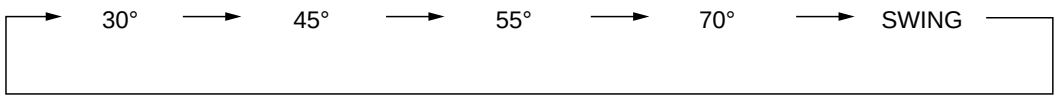
(iv)To eliminate the remaining heat, the indoor fan runs for the first 1 minute after the booster heater is turned OFF.

(3) Auto vane control

(a) STOP mode (fixed operation)

(i) The airflow direction at the start-up of HEAT operation is the same as that of the previous operation.

(ii) The airflow direction can be charged by the remote controller setting.



(SW5-3 : OFF/ON)

In the following cases, airflow direction becomes 30° regardless of the remote controller setting.

① During the hot adjustment with fan speed at EXTRA-LOW

② During defrosting within door fan OFF

③ During the thermostat OFF

(b) SWING mode

(i) The vane motor turns ON when the SWING mode is selected.

The vane motor is continuously ON during SWING mode.

(ii) In the following cases, the airflow direction is 30 regardless of the remote controller setting.

① During the hot adjustment with fan speed at EXTRA-LOW

② During defrosting with indoor fan OFF

③ During thermostat OFF

(4) Booster heater control

When the room temperature is 3 degrees below the set temperature, the booster heater will turn ON.
When the room temperature is equal to the set temperature, booster heater will turn OFF.
During the hot adjustment, the booster heater will not work.

<Overheat prevention>

When the indoor coil thermistor rises to 60°C or above, the booster heater cannot work.
When the indoor coil thermistor falls to 55°C or below, the booster heater can work.

(5) Detecting abnormalities in the outdoor unit

When the outdoor unit is determined to be abnormal by the following causes, the compressor will stop and the check code " P8 " will appear on the remote controller display.

①During compressor ON after hot adjustment ※1 (See the next page.)

①If the difference between the indoor coil temperature and room temperature is in the RANGE B, the indoor fan will stop.

② Within 20 minutes after entering RANGE B (except for the first 10 seconds),

a) If the temperature difference enters RANGE A, the hot adjustment stasrts,

b) If the temperature difference is still in RANGE B, the outdoor unit is deemed abnormal.

c) If the temperature difference enters RANGE C, defrosting starts.

Within 20 minutes after entering RANGE C,

- ●If the temperature difference does not return to RANGE B, the outdoor unit is deemed abnormal.
- ●If the temperature difference returns to RANGE B, the next 20 minutes is an allowance period. If the difference enter RANGE A during the allowance, defrosting ends and the hot adjustment starts. If the difference does not enter RANGE A during the allowance, the outdoor unit is deemed abnormal.

②During compressor ON in hot adjustment

After 30 minutes of defrosting in hot adjustment, if the temperature difference is still in RANGE C, the outdoor unit is determined to be abnormal.

③ During compressor OFF

After 20 minutes of thermostat OFF, if the indoor coil thermistor reads -25°C or below, the outdoor unit is determined to be abnormal.

(6) Indoor coil thermistor abnormality detection

An abnormality can be detected during compressor ON, except for the following.

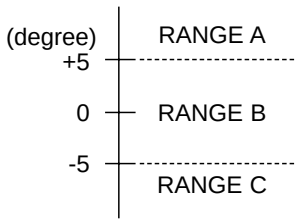
- ●For the first 30 minutes after the temperature difference between the indoor coil temperature and room temperature enters the RANGE C.(See the below figure 1.)
- ●When the temperature difference enters the RANGE C until it moves to the RANGE B.

(7) Defrosting operation

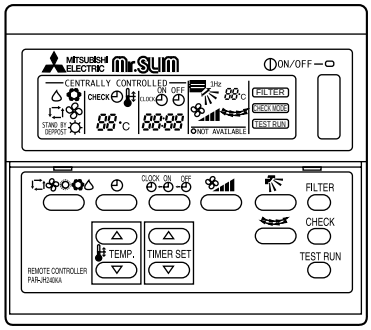
After the outdoor unit starts the defrosting operation, when the temperature difference beetween the indoor coil temperature and room temperature gets out of RANGE A and into RANGE B, the indoor unit starts the defrosting mode. After the outdoor unit stops the defrosting operation, when the temperature difference returns to the RANGE A, the indoor unit stops the defrosting mode. While the indoor unit is in the defrosting mode, the indoor fan and the booster heater stop.

※1 RANGE A : Indoor coil temperature is more than 5 degrees above room temperataure.
RANGE B : Indoor coil temperature is within 5 degrees either way of room temperature.
RANGE C : Indoor coil temperature is more than 5 degrees below room temperature

Fig.1 Indoor coil temperature minus room temperature



2-4 AUTO operation (Automatic COOL/HEAT change over operation)



<How to operate>

① Press POWER ON/OFF button.
② Press the button to display "".
③ Press the TEMP button to set the desired temperature.

NOTE: The set temperature changes 1°C when the △ or ▽ button is pressed one time.
Automatic 19 to 28°C

- "AUTOMATIC" works to change by itself the operation mode either to cooling or heating according to the room temparature.

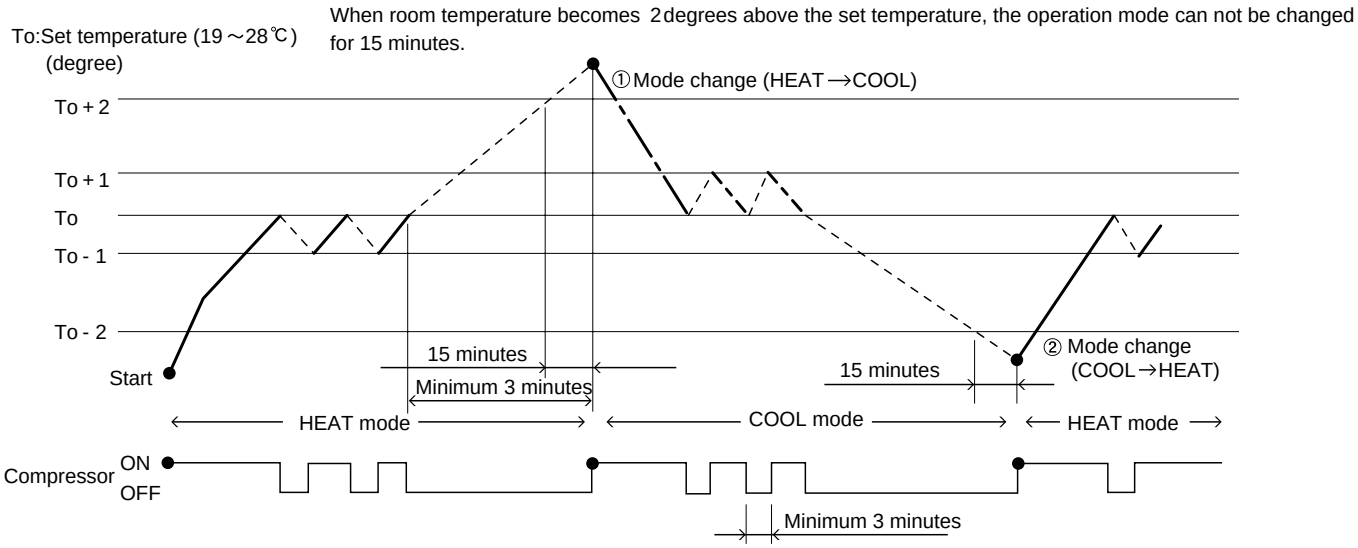
(1) Initial mode

① When AUTO operation starts after unit OFF.
- If the room temperature is higher than the set temperature, operation starts in COOL mode.
- If the room temperature is equal to or lower than the set temperature, operation starts HEAT mode.

② When AUTO operation starts after COOL or HEAT operation, the previous mode continues.

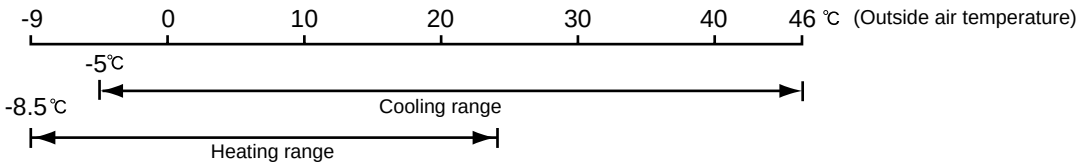
(2) Mode change

① HEAT mode changes to cool mode when 15 minutes have passed since the room temperature became 2 degrees above the set temperature.
② COOL mode changes to HEAT mode when 15 minutes have passed since the room temperature became 2 degrees below the set temperature.

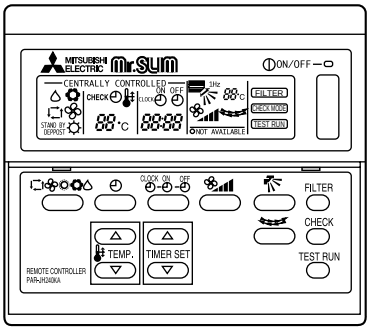


(3) Temperature range

AUTO operation is available under the outside air temperatures as follows.

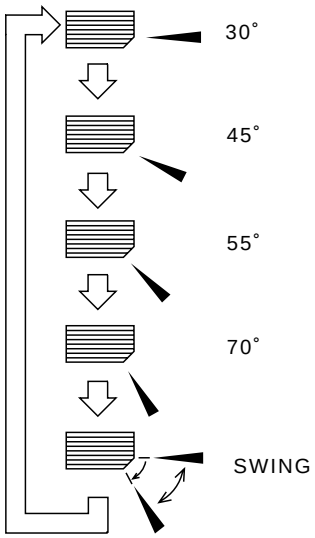


2-5 Auto vane control



<How to operate>
To change the air flow direction, press button.

NOTE: Airflow direction can be set by the indoor dipswitch SW5-1.



Changes by pressing the button.

Available in COOL operation with fan speed on HIGH or in HEAT operation.
Unavailable in DRY operation.
If fan speed changes from LOW to HIGH during 45° downward airflow in COOL mode, the direction automatically changes to 30°.

(1) COOL/DRY operation

At the start-up of COOL or DRY operation, the airflow direction in automatically set to 30°. After, it can be changed to another direction with button on the remote controller.

<Auto return>

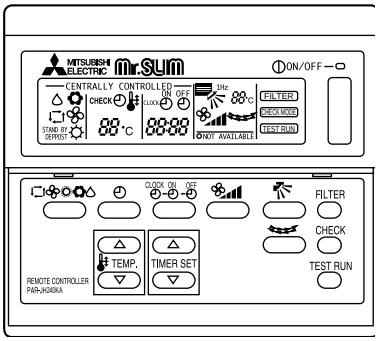
When 55° or 70° airflow is set with fan speed in LOW, “AUTO RETURN” appears below the room temperature display. One hour later the direction changes to 30° degrees, automatically and “AUTO RETURN” disappears.

(2) HEAT operation

At the start-up of HEAT operation, airflow direction depends on the setting of the last operation.
After, it can be changed to another direction with button. The airflow direction shifts to 30° regardless of the remote controller settings under any of the following conditions.

- Thermostat OFF
- Defrosting
- Indoor fan speed EXTRA-LOW in hot adjustment

2-6 TIMER operation



<Timer function>

AUTO STOP ·····The air conditioner stops after the set time lapses.
AUTO START ·····The air conditioner starts after the set time lapses.
TIMER OFF ·····Timer is not active.

<How to operate>

1. Press POWER ON/OFF button.
2. Press " ◴ " button to select AUTO STOP or AUTO START.
3. Press " CLOCK ◴ ON ◴ OFF ◴ " button to set desired time.
   Time setting is in 1 hour units for up to 24 hours.
   Each time HOURS button is pressed, set time increases by 1 hour.
   When HOURS button is pressed and held, the set time increases by 1 hour every 0.5 seconds.
4. To cancel the timer operation, press POWER ON/OFF button.

<Timer setting example>

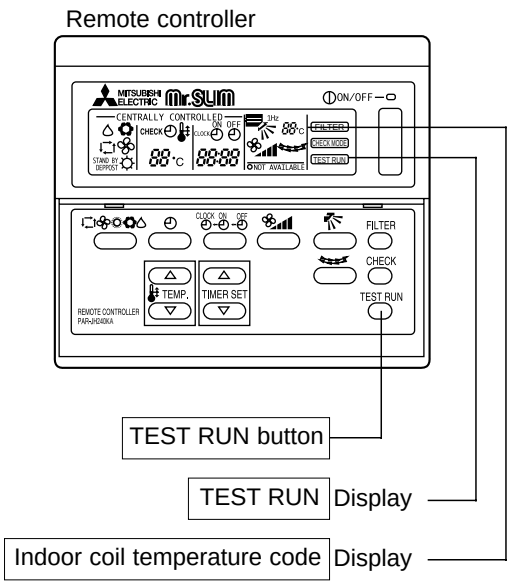
This setting will stop the air conditioner in 8 hours.
With the lapse of time, time display changes in 1 hour units, showing remaining time.

2-7 Test run

<Before test run>

- After installing, wiring, and piping the indoor and outdoor units, check for refrigerant leakage, looseness in power supply or contorol wiring, and mistaken polarity.
- Use a 500-volt megger to check the resistance between the power supply terminal block and ground to make sure that it is at least 1.0MΩ.

Attention:
Do not use the air conditioner if resistance is less than 1.0MΩ.



*The above figure shows the state of TEST RUN at cooling operation.

1	Turn on main switch.12 hours before proceeding to step 2 to allow for crankcase heater operation.
2	Push the TEST RUN button twice and indication of TEST RUN will be shown on the liquid crystal display.
3	Press the button to display ,COOL/DRY(or HEAT)to confirm that cool (or warm)air is blown out. (At heating operation,there may be a short delay before warm air begins to blow out.)
4	Push button LOW/HIGH to check that the fan speed changes properly.
5	Check the operation of outdoor unit fans.This unit controls the rotation speed and performance capacity of fans.In some cases,it may rotate at low speed as the condition of outside air requires and the speed will be kept unless the performance has become deficient. Therefore,when the condition of outside air demands,there may be such cases as the fan stops or rotates reversely. Please note that these symptoms are not mulfunction.
6	After the check is finished leave the test run mode, push the power ON/OFF button. It can also be stopped by pushing the timer MODE button.

●When a TEST RUN is started, the timer shall be set to 2 hours. The unit will automatically turn off after 2 hours.

(1) Indoor coil temperature code
During the test run, the indoor coil temperature code from 1 to 15 is displayed on the remote controller instead of room temperature. The code should fall with the lapse of time in normal COOL operation, and should rise in normal HEAT operation.

Code	1	2	3	4	5	6	7	8
Indoor coil temperature	-40~1℃	~10℃	~15℃	~20℃	~25℃	~30℃	~35℃	~40℃
Code	9	10	11	12	13	14	15	
Indoor coil temperature	~45℃	~50℃	~55℃	~60℃	~70℃	~90℃	Thermistor abnormality	

(2) Trouble during test run
- If the unit malfunctions during the test run, refer to section 10 in this manual entitled “TROUBLESHOOTING.”
- When the optional program timer is connected to the conditioner, refer to its operating instructions.

2-8 Emergency operation

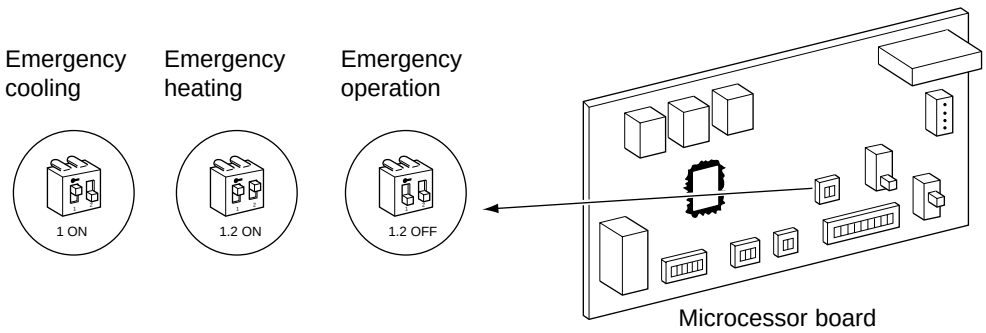
When the remote controller or microprocessor malfunctions but all other parts are normal, emergency operation is started by setting the dipswitch SW3 on the indoor controller board.

<Before emergency operation>

1. Make sure the compressor and the indoor fan are operating normally.
2. Locate the defect with the self-diagnostic function. When the self-diagnostic function indicates “protective function is working”, release the protective function before starting the emergency operation.
   CAUTION: When the self-diagnostic function indicates a check code of “P5” (drain pump malfunction), DO NOT start the emergency operation because the drain may overflow.

<How to operate>

1. For emergency cooling, set the dipswitch SW3-1 to ON and SW3-2 to OFF.
   For emergency heating, set the dipswitch SW3-1,2 to ON.



2. Turn ON the outdoor unit breaker and then ON the indoor unit breaker.
   Emergency operation will now start.
3. During emergency operation, the indoor fan operates on high speed, but the swing louvers and the auto vanes do not operate.
4. To stop emergency operation, turn OFF the indoor unit breaker.

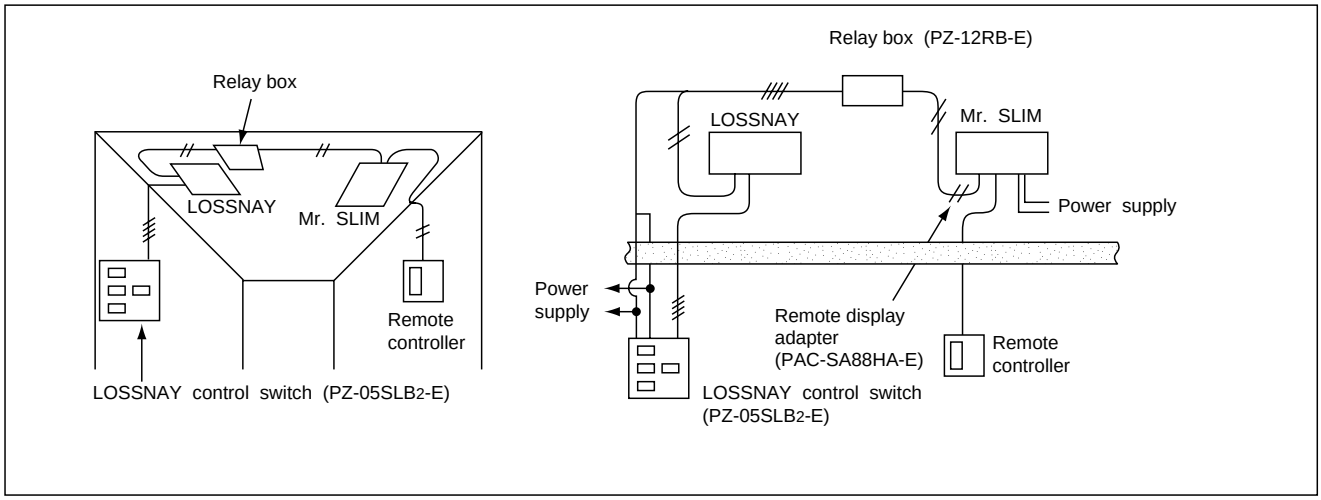
NOTE: The remote controller POWER ON/OFF button can not start/stop emergency operations.

CAUTION: Do not use emergency cooling for more than 10 hours, as the indoor coil may freeze.

2-9 Interlock with ventilation system (LOSSNAY)

Mr. SLIM/LOSSNAY interlock operation is available by using the optional parts listed below.

(1) System organization



(2) LOSSNAY models connectable to Mr. SLIM are: LGH-15RS-E, LGH-50RS-E
LGH-25RS-E, LGH-80RS-E
LGH-35RS-E, LGH-100RS-E

(3) Reqired parts are:

- Relay box (PZ-12RB-E)···Contact capacity 10A
- Remote display adapter (PAC-SA88HA-E)···An optional part for Mr. SLIM
- LOSSNAY control switch (PZ-05SLB2-E)···For LOSSNAY individual operation

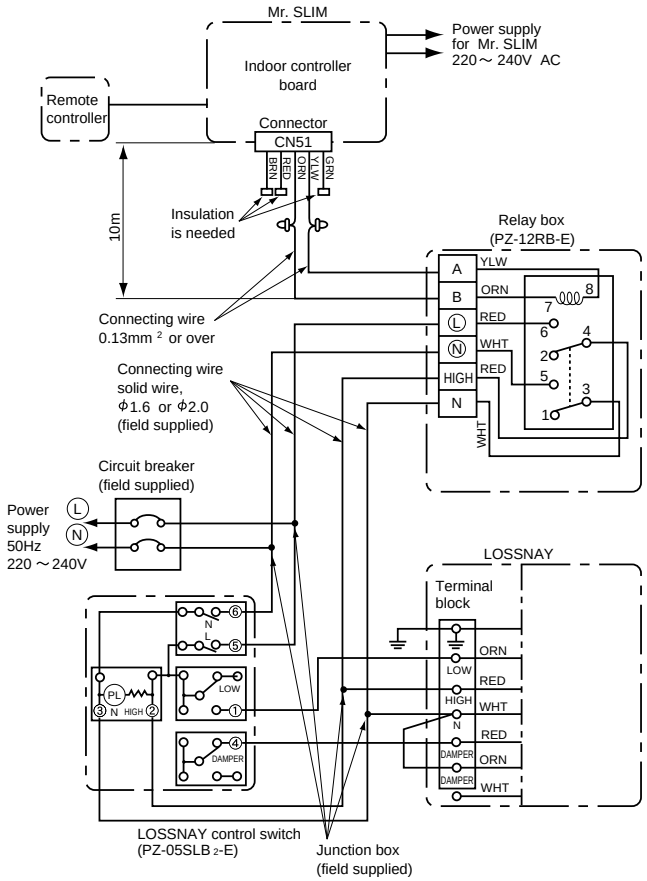
(4) Operation

①LOSSNAY turns ON/OFF according to Mr. SLIM ON/OFF.

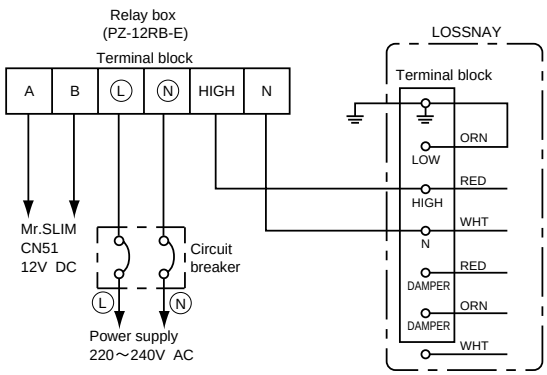
②While Mr. SLIM is OFF, LOSSNAY individual operation is available by using the LOSSNAY control switch. When Mr. SLIM turns OFF with the LOSSNAY control switch at ON, LOSSNAY will continue to operate.

(5) Wiring.

①When the LOSSNAY control switch is used



②When the LOSSNAY control switch is not used:



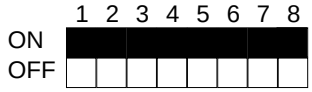
NOTE: For further information, refer to the LOSSNAY technical & service manual.

2-10 Dip switch functions

Each figure shows the initial factory setting.

1 On remote controller board

(1) SW17(Address selector)

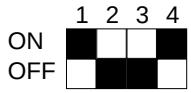


SW17-1~6) For address setting

SW17-7) When two remote controllers are used,this switch sets the controller function.
OFF:The remote controller is set as a main controller.
ON: The remote controller is set as a sub controller.

SW17-8) Switch for system back-up
OFF:Without back-up
ON: With back-up

(1) SW18(Function selector)



SW18-1) Switch for timer
OFF:Single day ON:timer every day

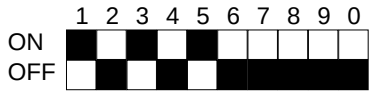
SW18-2) Switch for filter sign
OFF:filter sign adsent
ON: filter sign present

SW18-3) Switch for filter sign time setting.
OFF:100Hr ON:2500Hr

SW18-4) Not yet used.

2 On indoor controller board

(1) SW1 (Mode selector)



SW1-1) Switch that changes between FAN mode and AUTO mode
OFF: Fan mode for models without heat pump
ON: AUTO mode for models with heat pump

SW1-2) Switch for auto vanes
OFF: Unit without auto vanes
ON: Unit with auto vanes

SW1-3) Switch for drain pump
OFF: The drain pump works in only COOL operation.
ON: The drain pump works in both COOL and HEAT operation.

SW1-4) Switch to change the temperature to start coil frost prevention
OFF: –3°C(For previous special models)
ON: 1°C(For all current models)

SW1-5) Switch for set temperature adjustment in HEAT mode
During HEAT operation, warm air collects near the ceiling. When the indoor unit is installed near the ceiling, the temperature read by room temperature thermistor differs from the actual living-space temperature by about 4 degrees. Therefore, the room temperature read by room temperature thermistor must be lowered by 4 degrees.
OFF: 4-degree adjustment
ON: NO adjustment

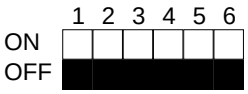
SW1-6) Switch for fan speed during thermostat OFF in HEAT operation
OFF: EXTRA LOW
ON: LOW

SW1-7) Switch for fan speed during thermostat OFF in HEAT operation
OFF: EXTRA LOW or LOW(set with SW1-6)
ON: LOW or HIGH(set with remote controller)

SW1-8) Switch for detecting abnormalities in the outdoor unit abnoamality detection
OFF: When an abnormality occurs, it is detected.
ON: Even if an abnormality occurs, it can not be detected.

SW1-9) Switch for auto restart function
OFF: This function does not work.
ON: This function works.

(2) SW2 (Address selector)

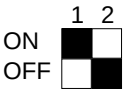


Used in setting the unit-address for group control.
For further information,refer to page 52.

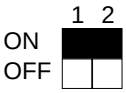
(3) SW3 (Emergency operation switch)

Normal operation

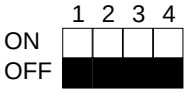
For emergency cooling



For emergency heating

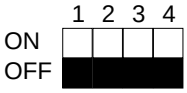


(4) SW5 (Model selector)



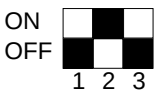
SW5-1) Not for use.
SW5-2) OFF:For models with heat pump
ON: For models without heat pump
SW5-3) Not for use.
SW5-4) This switch is unavailable for PLH-KK(H)C. Keep this switch at OFF.

(5) SW6 (Twin,Triple switch)

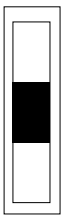


	Single control	Twin control	Triple control
SW6-1	OFF	ON(Twin NO.1)	ON(Triple NO.1)
SW6-2	OFF	ON(Twin NO.2)	ON(Triple NO.2)
SW6-3	OFF	OFF	ON(Triple NO.3)
SW6-4	OFF	OFF	ON

(6) SW7 (Model selector)
Switch to set the output of phase-controlled indoor fan motor.
Address setting is available at any time.
The initial factory setting by is based on each capacity.

Service Ref.	PLH-1.6KKHC PLH-2KKHC	PLH-2.5KKHC
SW7		

(7) SWA (High ceiling, noise saving selector)



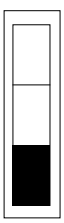
③ : High ceiling
② : Standard
① : Silent

Ceiling height & airflow direction

(Unit : m)

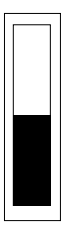
SWB \ SWA	Standard	High ceiling ①	High ceiling ②
4-direction airflow	2.4	2.7	3.0
3-direction airflow	2.7	3.0	3.3

(8) SWB (Air outlet number selector)



2 (Not used)
3 3-direction airflow
4 4-direction airflow (Standard)

(9) SWC (Option selector)



Option

Standard

When mounting the optional high efficiency filter, set this switch to “option”

2-11. INDOOR FAN CONTROL

(1)Fan motor max. rotational frequency for PLH-KKHC

Service Ref.	Voltage [V]	100% rotational frequency(rpm) 50Hz
PLH-1.6KKHC	220	586
	230	608
	240	629
PLH-2KKHC	220	586
	230	608
	240	629
PLH-2.5KKHC	220	611
	230	634
	240	657

(2)Indoor fan relay output

(a)During fan ON

The indoor fan relay turns ON. One second later, the phase control will start.

(b)During fan OFF

The phase control turns OFF. One second later, the indoor fan relay will turn OFF.

3. OUTDOOR UNIT CONTROL

3-1 Outdoor fan control

The rotational frequency of outdoor fan is phase-controlled according to the outdoor coil temperature. This control allows the cooling operation even with the low outside-air temperature and the heating operation even with the high outside-air temperature.

3-2 Outdoor unit control

The outdoor unit turns ON/OFF the cooling/heating operation according to orders given from the indoor unit.

3-3 Protective functions

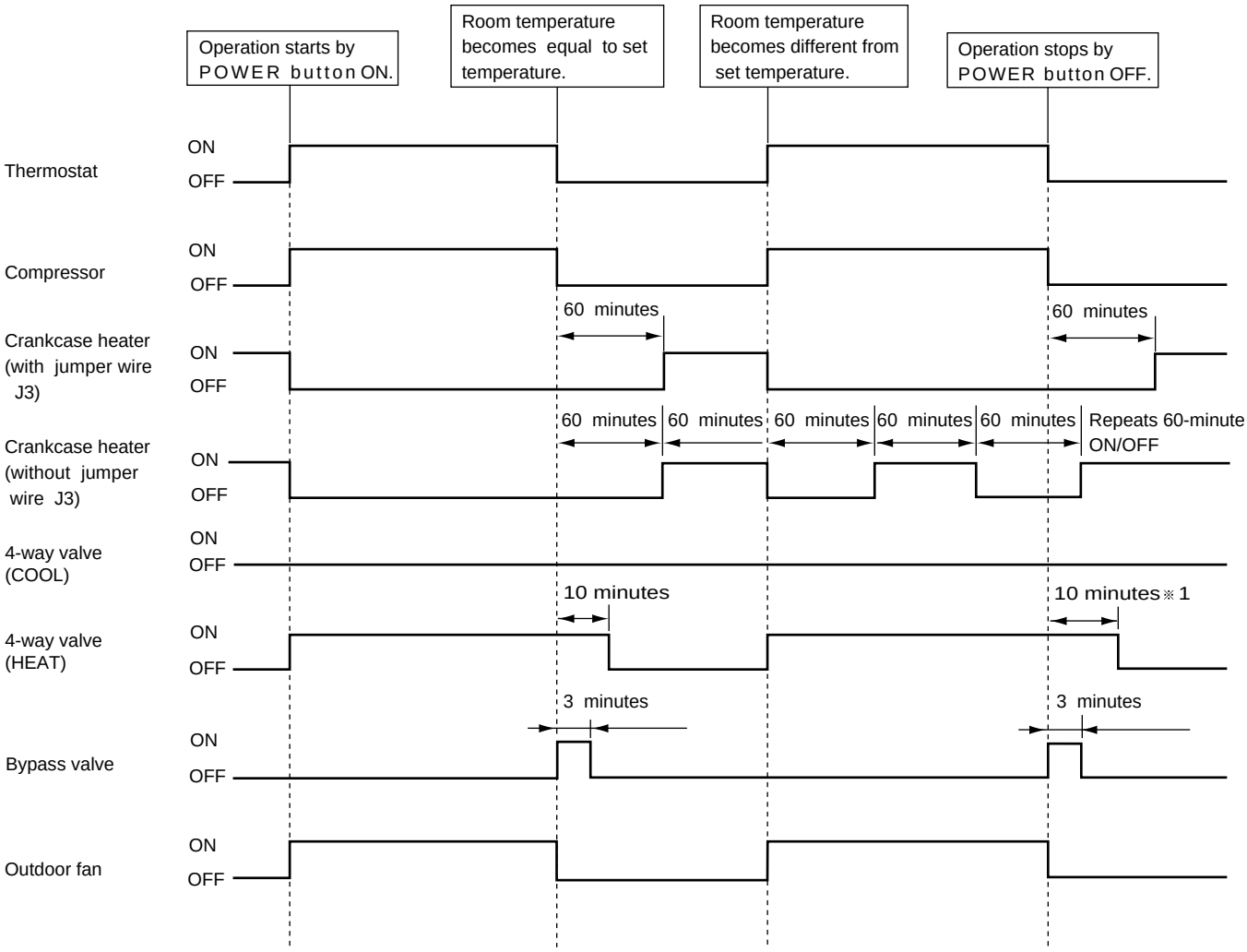
① If an reversed-phase, an open phase, or an indoor controller abnormality is detected, the outdoor unit will stop operation and the check mode will start. (For the check mode details, see page 45.)

② If a protective function works, the compressor will stop running. Three minutes later, the compressor will restart. If the protective function works again, the compressor will stop running and the check mode will start.

③ The protective function is memorized.

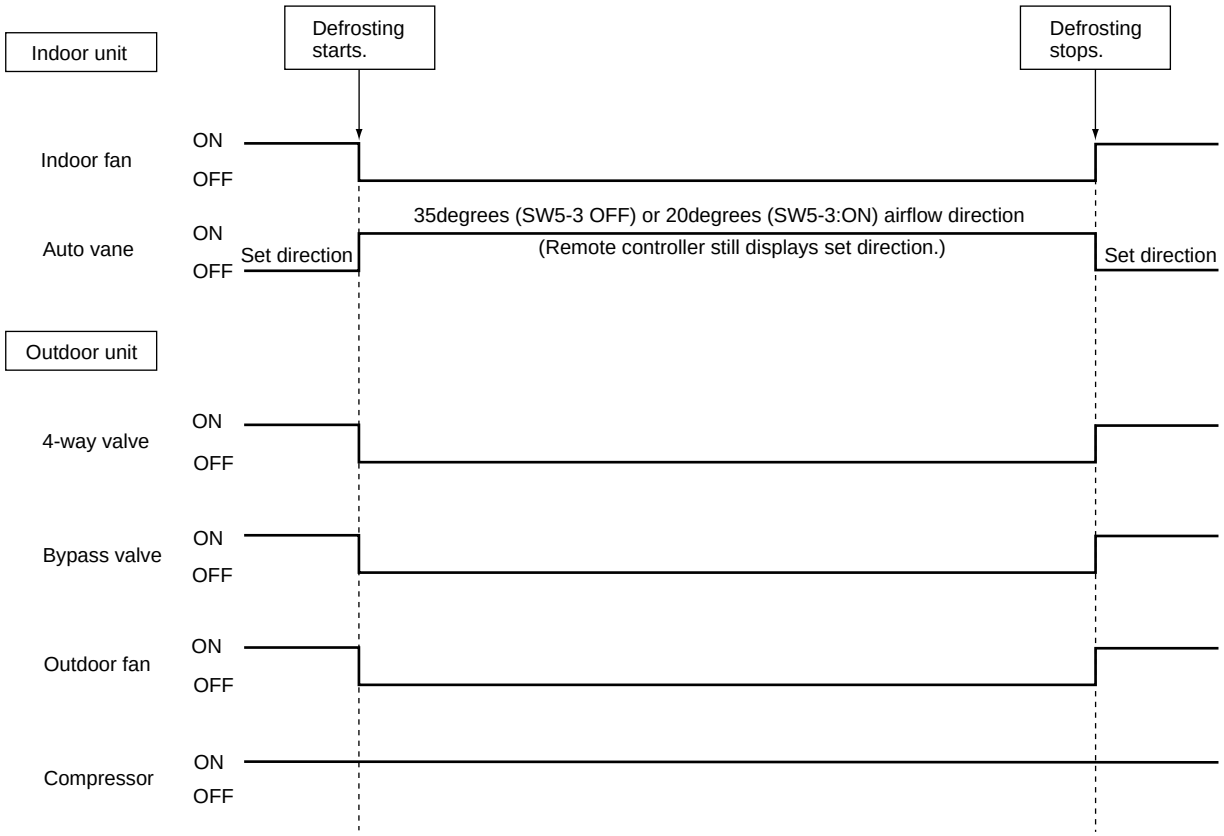
④ The memory is cleared when the POWER ON/OFF button on the remote controller is turned OFF. However, the check mode dispaly continues until the outdoor unit receives the “operation ON” command from the indoor unit.

3-4 COOL/HEAT operation time chart



※1 If compressor restarts within 10 minutes, 4-way valve remains ON.

3-5 Defrosting in HEAT mode
<Defrosting time chart>



(1) Start conditions

A. When all of the following conditions are satisfied, defrosting will start. However, when the bypass valve turns OFF, defrosting starts 10 minutes later.
   (a) More than seven minutes have passed since the compressor start-up.
   (b) The outdoor coil thermistor reads -5°C or below.
   (c) The outdoor fan motor output step is 100%
   (d) Total time of compressor operation exceeds 30 minutes, and the outdoor coil temperature has fallen by 8 degrees or more in comparison with that of 10 minutes after the compressor start-up.
      NOTE: The outdoor coil temperature of 10 munites after the compressor start-up is memorized until the defrosting operation has ended.

B. When all of the following conditions are satisfied, defrosting will start.
   (a) ~ (c) The same as above (a) ~ (c) in item A
   (d) Total time of compressor operation exceeds “defrost interval”.
      Further information on the defrost interval is described in (3).

C. After the total time of compressor operation exceeds the defrost interval, the thermostat repeats ON/OFF three times. Two minutes after the fourth “ON” of the thermostat, if the outdoor coil thermistor reads -5°C or below and the fan output output is 100%, defrosting will start.
      NOTE: The count of the thermostat ON/OFF is cleared by the compressor-OFF command or defrosting start-up.

(2) During defrosting

- Even if the thermostat turns OFF, defrosting continues.
- The 4-way valve, bypass valve, outdoor fan, and indoor fan are OFF.

(3) Defrost interval

The defrost interval time is determined as follows.

- Initial defrost interval is 50 minutes.
- The defrost interval after defrosting depends on the preceding defrosting time as shown below.

Defrosting operation time	Next defrost interval
3 minutes or below	120 minutes
3 to 7 minutes	80 minutes
7 to 10 minutes	60 minutes
10 to 15 minutes	40 minutes
15 minutes (Maximum)	30 minutes

NOTE1:If the unit stops during defrosting , the next defrost interval will be 50 minutes.

NOTE2:If a protection function works for the first time during defrosting, the compressor will stop.
After a 3-minute time delay, defrosting will restart. In this case, a 3-minute time delay is included with the defrosting time.
If the protection function works for the second time, the unit stops operation and displays the check code.
The next defrost interval will be 30 mimutes.

NOTE3:When the defrosting has ended, the total time of the compressor operation is cleard.

(4) Termination conditions

Defrosting finishes when any of the following conditions are satisfied.

①Defrosting has continued for 15 munites.
②Outdoor coil thermistor reads 22°C or above for the first 75 seconds after defrosting start-up.
③Outdoor coil thermistor reads 8°C or above after the 75-second defrosting.
④Power ON/OFF button is turned OFF during defrosting.

3-6 Actuators

(1) Bypass valve control

<Cooling mode>

①When the unit stops due to the coil frost prevention, the bypass valve turns ON. When one hour ahs passed since the compressor stopped, the bypass valve returns to OFF.
②When the compressor operates with the bypass valve at ON for more than 30 minutes, the bypass valve turns OFF.
③When the compressor stops with the bypass valve at OFF, the bypass valve turns ON and remains ON for three minutes.

<Heating mode>

①When the unit starts for the first time after the circuit breaker has been turned ON, or when it starts after the compressor OFF of 30 minutes or more, if the outdoor coil thermistor reads 12°C or more, the bypass valve turns ON.
②When the high pressure switch (63H1) works, the bypass valve turns ON.
③When the bypass has been ON for 30 minutes:
- If the high pressure switch has already returned, the bypass valve turns to OFF.
- If not, the fan output step keeps 70 for three minutes. Meanwhile, if the high pressure switch returns, the bypass valve turns OFF. Otherwise the normal fan control starts.

④When the operation mode changes or stops, the bypass valve turns ON and remains ON for three minutes.

<Defrosting operation>

①The bypass valve is OFF.

(2) Crankcase heater control

①With jumper wire J3
The crankcase heater is ON from when the power is turned ON until the compressor starts, and then turns ON one hour after the compressor stops.
②Without jumper wire J3
The crankcase heater is ON from when the power is turned ON until the compressor starts, and repeats 1-hour ON and 1-hour OFF.

3-7 Service functions

(1) Compulsory defrositng

①When all of the following conditions are satisfied, pressing SW2 starts the compulsory defrosting.

- During HEAT mode
- The compressor is ON.
- The outdoor coil temperature is being displayed by LED. (Outdoor controller board dip switch SW3-1 : OFF, SW3-2 : ON)
- The outdoor coil thermistor reads 8°C or below.

②The operation state and the termination conditions of the compulsory defrosting are the same as those of the normal defrosting. As an exception, the defrost interval after the defrosting completion is 50 minutes.

(2) Fixed fan-output

While the compressor is operating (exept during defrosting) and the fan output step is indicated by LED, pressing SW2 fixes the fan output. The fixed fan-output can be released when any of the following conditions are satisfied.

①SW2 is pressed again.
②SW3 setting is changed.
③The compressor stops.
④Defrosting operation starts.

(3) Function of switches on the outdoor controller board

SW1: Clears the check code memory (push-button switch)
SW2: Switches the output state indication and the check code display (push-button switch)
SW3-1,2: Switches the output state indication items (dip swtich)
For further information, refer to page 50.⑤

(4) 100% fan output

Fan output is fixed to 100% by shorting the connector CN22. However, the fan stops during compressor OFF or defrosting. Open-circuit of CN22 restarts the normal fan control.

(5) Time shorterning

Short circuit of the connector CN21 shortens the time as follows

①Fan control period: 30 seconds → 3 seconds
②Three-minutes time delay function : 3 minites → 3 seconds
③Max. time of defrosting : 15 minites → 15 seconds
④Defrost interval : 30 ~ 120 minutes → 3 ~ 12 seconds
⑤ Compressor ON/OFF time for bypass valve ON/OFF : 30 minutes → 3 seconds
⑥Compressor ON time to start other functions : x minutes → x seconds
⑦Crankcase heater operation : 1 hour → 6 seconds

10 TROUBLESHOOTING

1.TROUBLE IN TEST RUN

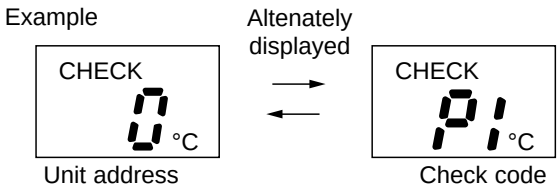
<table>
<tr><th>Symptom</th><th>Cause</th><th>Check points</th></tr>
<tr><td>The display “CENTRALLY CONTROLLED” on remote controller dose not disappear.</td><td>1) Wrong address setting of remote controller/indoor controller board.
2) Timer adapter is connected to the remote controller.
3) Singnal transmission error between indoor unit and remote controller.</td><td>1) Check the address setting of remote controller and indoor controller.
2) Make sure the timer adapter is used correctly.
3) ① Turn another remote controller’s DIP SW17-7 ON to make it sub controller.
② Connect the sub controller to the unit, and turn circuit breaker ON.
● If the display “centrally controlled” disappears, replace the original remote controller.
● If the display remains the same, replace the indoor controller board.</td></tr>
<tr><td>When remote controller POWER button is turned ON, the check code “EO”appears.</td><td>1) Signal transmission error between indoor unit and remote controller</td><td>1) ① Connect a sub remote controller.
② Turn circuit breaker ON.
If the display “centrally controlled” remains, replace the indoor controller board.
③ If the display disappears, turn the remote controller POWER button ON and check as follows.
<table>
<tr><th></th><th>Remote controller</th><th>Sub remote controller</th><th>Malfunction</th></tr>
<tr><td>1</td><td>Operating Display</td><td>EO Display</td><td>Malfunction of indoor Unit</td></tr>
<tr><td>2</td><td>Operating Display</td><td>Operating Display</td><td>Malfunction of Remote controller</td></tr>
<tr><td>3</td><td>No Display</td><td>EO Display</td><td>Malfunction of indoor Unit and Remote Controller</td></tr>
<tr><td>4</td><td>No Display</td><td>Operating Display</td><td>Malfunction of Remote controller</td></tr>
</table></td></tr>
<tr><td>When remote controller POWER button is turned ON, operating display appears, but disappears soon.</td><td>1) Short circuit of indoor/outdoor connecting wire
2) Short circuit of transmission wire.
3) Short circuit of drain sensor heater circuit.
4) Wrong operation of remote controller due to noise wave emitted by other appliances.</td><td>1), 2) Check the wire
3) Measure the resistance of the drain sensor connector CN50 ① ~ ③. Normal resistance should be 82Ω.
4) Turn the circuit breaker OFF, and then turn ON.
If the remote controller remains abnormal, despite the above measures, replace the indoor controller board.</td></tr>
<tr><td>Despite turning POWER button ON, the remote controller display does not appear.</td><td>1) Damaged remote controller.
2) Short circuit of transmission wire.
3) Bad contact of indoor CN40.
4) CN40 is attached to a sub unit.
5) Damaged transformer.
6) Bad contact of CN4T.
7) Blown fuse.
8) Circuit breaker OFF.</td><td>1) Measure the voltage between terminals of remote controller. If no voltage, remove the terminals and measure the voltage between wires. If the voltage is between 6VDC and 12V, replace the remote controller.
2) ~ 8) Check each point.
If it is not defective, replace the indoor controller board.</td></tr>
</table>

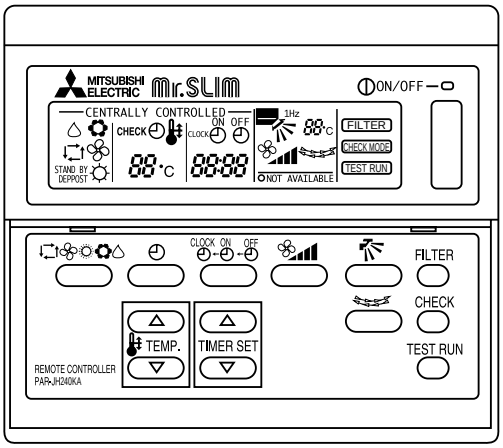
2. SELF DIAGNOSTIC FUNCTION WITH REMOTE CONTROLLER

2-1 When malfunction occurs during operation

When a malfunction occurs, the indoor and outdoor units stop and the malfunction is displayed on the LCD of the remote controller.

(A) ON the set temperature display part, “CHECK” appears, and the unit address and the check code are diplayed alternately at one-second intervals. (Check mode)





(2) When one remote controller controls several units in the group control, the LCD shows the unit address and check code of the first malfunctioning unit.

(3) To cancel the check mode, press the ΦON/OFF button. In remote ON/OFF control, press the remote Φ ON/OFF switch. In centralized control, turn OFF the Φ ON/OFF button of centralized controller.

NOTE: The latest check code is memorized, even if the check mode is cancelled by the way mentioned above. It takes 60 seconds maximum to display the memorized check code.

2-2 How to use the self diagnostic function for service

A. For normal control with one unit and one remote controller

(1) Pressing the ( ) CHECK button on the remote controller twice starts the self diagnostic function.

(2) During the self diagnostic function, “CHECK” appears at two positions on the remote controller display. Then, at least 10 seconds later, the unit address and the check code is alternately displayed at one-second intervals.

(3) Check and repair the unit according to the check code. (Refer to the next page.)

2-3 For group control using one remote controller

(1) Press the (△) TEMP.or (▽) TEMP. button on the remote controller to advance or go back to the unit address. Each time (△) TEMP. button is pressed, the unit address advances by one. Each time (▽) TEMP. button is pressed, the unit address goes back by one.
The check code and the unit address, appear alternately.

(2) The check code “U8” means no malfunction has occurred since installation.
The check code “EO” means the following conditions:
- The unit address displayed on the remote controller does not apply to any unit.
- Power is not supplied to the unit.
- Signal transmitting/receiving circuit is abnormal.

(3) Check and repair the unit according to the check code. (Refer to the next page.)

Check code	Diagnosis of malfunction	Cause	Check points
EO	Signal transmitting/receiving error (Indoor controller does not respond to remote controller signal.)	During individual unit control 1) Bad contact of transmission wire 2) Signal transmitting/receiving circuit is abnormal.	1) Check the transmission wire. 2) Check with another remote controller. If “EO” is still indicated, replace the indoor controller board. If other check code appears. replace the original remote controller.
P1	Abnormality of room temperature thermistor (RT1)	1) Bad contact of thermistor 2) Damaged thermistor	1) Check the thermistor. 2) Measure the resistance of the thermistor. Normal resistance should be as follows. 0 C ···15kΩ 30 C·····4.3kΩ 10 C·····9.6kΩ 40 C·····3.0kΩ 20 C·····6.3kΩ If the resistance is normal, replace the indoor controller board.
P2	Abnormality of indoor coil thermistor (RT2)		
P3	Signal transmission error (Remote controller does not respond to indoor controller signal.)	1) Bad contact of transmission wire 2) Signal transmitting/receiving circuit is abnormal. 3) Wrong operation due to noise wave emitted by other appliances	1) Check the transmission wire. 2) Check with another remote controller. If “P3” is still indicated, replace the indoor board. If other check code appears, replace the original remote controller. 3) Short-circuit between ① and ② of CN40 and attach CN40 to the following units. ● Second unit in twin control ● Second and third units in triple control ● Sub units in group control
P4	Abnormality of drain sensor	1) Bad contact of transmission wire 2) Damaged thermistor	1) Check the connector. 2) Measure the resistance of the thermistor ④ ~ ⑤. As for the normal resistance, refer to the case of P1. If the resistance is normal, replace the indoor controller board.
P5	Malfunction of drain pump	1) Malfunction of drain pump 2) Damaged drain sensor	1) Check the drain pump. 2) ● Check the drain sensor. ● Check the drain sensor heater. Normal resistance should be 82Ω. If the resistance is normal, replace the indoor controller board.
P6	Coil frost protection is working.	1) Short cycle of air cycle 2) Dirty air filter 3) Damaged fan 4) Abnormal refrigerant	1) Clear obstructions from the air cycle. 2) Clean the air filter 3) Check the fan. 4) Check the refrigerant temperature.
P7	System error	1) Wrong address-setting 2) Signal transmitting/receiving circuit of remote controller is abnormal. 3) Wrong SW6-setting	1) Check the address-setting. 2) Check with another remote controller. If check code other than “P7” appears, replace the original remote controller. 3) Check SW6 setting.
P8	Abnormality in outdoor unit	1) Wrong wiring of indoor/outdoor connecting wire 2) Reversed phase 3) Protection device is working 4) Damaged outdoor coil thermistor	1) Check the indoor/outdoor connecting wire. 2) Change the connection of electric wiring. 3) Check the protection device. 4) Measure the resistance of the outdoor coil thermistor. If the resistance is normal, replace the outdoor controller board.

3.SERVICE DATA INDICATION BY SWITCHES ON OUTDOOR CONTROLLER BOARD

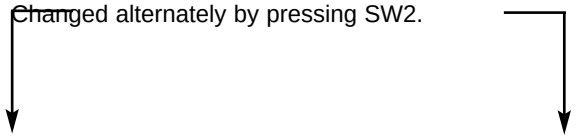
Setting dip switchs SW2 and SW3 on the outdoor controller board enables LED to show the output state and check code.
Output state is shown by LED lighting, and check code by blinking.

SW1 : Turning SW1 ON clears the check code. If SW1 is turned ON while the check code is blinking , the indication changes to output state indication.

NOTE : SW1 is usually available independant of SW3 setting. As an exception, when the check code shows a reversed phase or an open phase during the power-on-reset state, SW1 is not available.

SW2 : SW2 is turned ON by pressing, and OFF by releasing.
When SW3-1 and SW3-2 are OFF, pressing SW2 changes indication between output state and check code alternately.
When SW2 is turned On with SW3-1 OFF and SW3-2 ON, the compulsory defrosting starts.

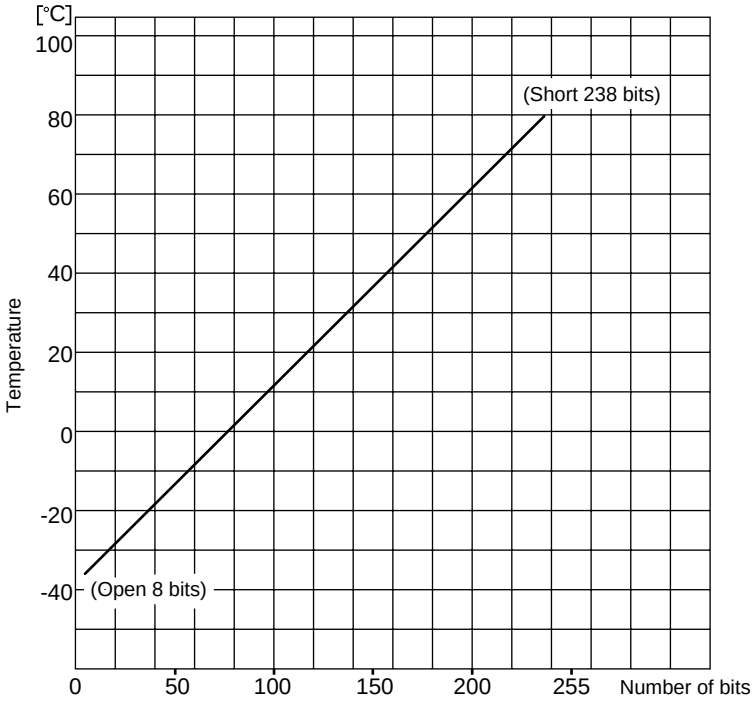
SW3 : Output state indication items depend on the combination of SW3-1 ON/OFF and SW3-2 ON/OFF.



	Check code	Output state	Outdoor coil temperature (bit)	Fan outpuit step (bit)	Total time of compressor operation(Hr)
SW3-1	OFF	OFF	OFF	ON	ON
SW3-2	OFF	OFF	ON	OFF	ON
LED	Blinking	Lighting			
LD1	Reversed phase	Compressor ON command from indoor controller	1	1	256
LD2	Open phase	Heating operation command from indoor controller	2	2	512
LD3	Outdoor coil thermistor is abnormal.	During 63H1 function	4	4	1024
LD4	63H2 function	Compressor ON	8	8	2048
LD5	51C function	Outdoor fan ON	16	16	4096
LD6	26C function	4-way valve ON	32	32	8192
LD7	Overheat protection	Bypass valve ON	64	64	16384
LD8	Input circuit on controller board is abnormal	Crankcase heater ON	128	128	32768

3-1 Outdoor coil temperature

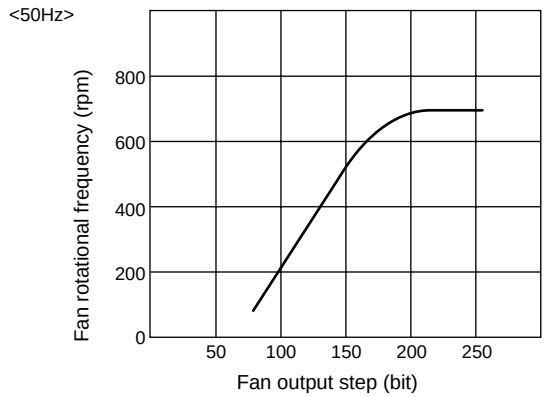
To obtain data on the outdoor coil temperature, add the number of bits of lighting LEDs, and see the graph below to find the temperature.



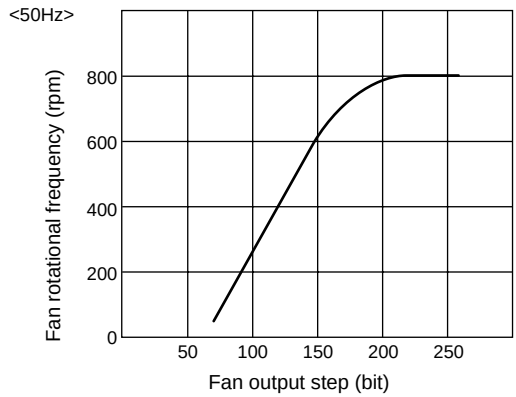
3-2 Fan output step

To obtain data on the fan output step, add the number of bits of lighting LEDs, and see the graph below to find the fan rotational frequency.

①PUH-1.6/2KA type



②PUH-2.5KA type



3-3 Total time of compressor operation

Compressor operation time is indecated in 256 hour units. To obtain the compressor operation time, add the hours of lighting LEDs. During the compressor operation time indication, SW2 is not available.

3-4 Check code indication

- When a protection function works for the first time during operation, the operation stops and restarts after the 3-minutes time delay mode. When the protection function works again, the operation stops. (Check mode) When both SW3-1 and SW3-2 are OFF, the check code is indicated.
- If the outdoor controller board receives the compressor ON command from the indoor controller board during check mode the indication changes to output state indication.
- By pressing SW2 duirng normal operation. operation will continue.
- The latest check code is indicated.

4. TROUBLESHOOTING ACCORDING TO CHECK CODE

Blinking LED	Diagnosis of malfunction	Cause	Check point
LD1	Reversed phase	Phases A_1, A_2, and A_3 are connected improperly.	Check the power supply connection.
LD2	Open phase	● Phase A_2 is open. ● Contact of protector, such as thermal switch, opened when power was turned on.	● Check the power supply. ● Check each protector.
LD3	Outdoor coil thermistor is abnormal. (Open circuit or short circuit)	● Outdoor coil thermistor is broken. ● Thermistor was connected incorrectly.	● Measure the resistance of the thermistor. ● Check the thermistor. If normal, replace the outdoor controller board.
LD4	High pressure switch (63H2) function	● 62H2 was badly connected. ● 63H2 was working.	● Check 63H2 and the outdoor fan motor. ● Check if refrigerant supply is low. ● Check if air cycle is short-cycled.
LD5	Thermal relay (51C) function	● 51C was connected incorrectly. ● 51C was working.	● Check 51C, the compressor, and power supply.
LD6	Thermal switch (26C) function.	● 26C was connected incorrectly. ● 26C is working.	● Check 26C. ● Check if refrigerant supply is low. ● Check if the capillary tube is clogged.
LD7	Over heat protection	● The thermistor is broken. ● Coil temperature is over 67°C.	● Measure the resistance of the thermistor. ● Check the outdoor fan motor. ● Check if air cycle is short-cycled.
LD8	Input circuit of outdoor controller board is abnormal.	● Pulse input is abnormal.	● Replace the outdoor controller board.

5. WHEN OUTDOOR UNIT DOES NOT WORK

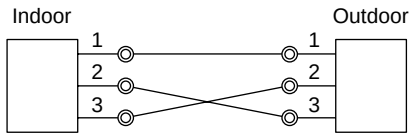
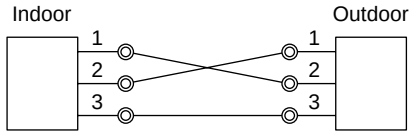
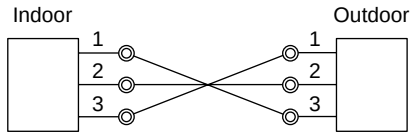
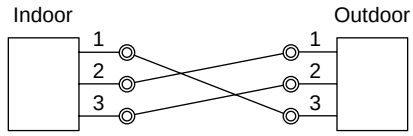
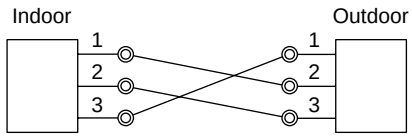
Cause	Check points
1) Indoor/outdoor connecting wires are poorly connected. (Refer to next page.)	1) Check the connecting wires.
2) Power supply is poorly connected.	2) Check the power supply.
3) Connector or transformer is broken.	3) Check connectors and transformers.
4) Fuse (6A) in the outdoor controller board is blown.	4) Check the fuse.

6. WRONG WIRING ON SITE

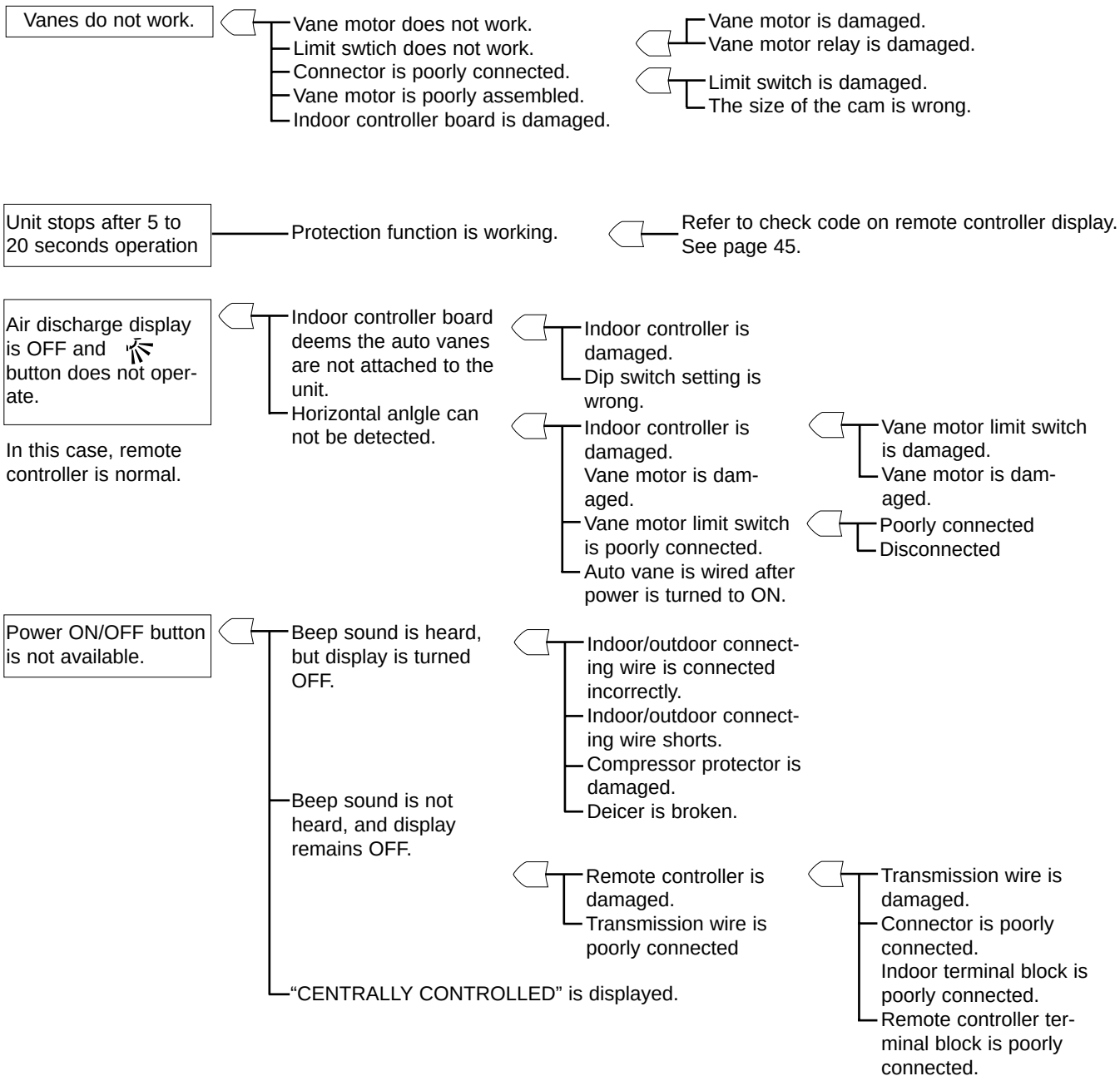
6-1 Between remote controller and indoor unit

If the wire is disconnected between the remote controller and the indoor unit, nothing is displayed on the remote controller when the POWER button is pressed. The beep sound will also not be heard.

6-2 Phenomenon due to wrong wiring between indoor and outdoor units

Wrong wiring	Mode	Thermostat	Phenomenon
	COOL	OFF	Operation stops.
		ON	4-Way valve turns ON. 9 minutes later, check code “P8” appears on remote controller display.
	HEAT	OFF	Cooling operation. Several minutes later, check code “P8” appears on remote controller display.
		ON	Normal operation.
	COOL	OFF	Outdoor unit stops.
		ON	Operation stops. 9 minutes later, check code “P8” appears on remote controller display.
	HEAT	OFF	Operation stops.
		ON	Operation stops. 27 minutes later, check code “P8” appears on remote controller display.
	COOL	OFF	Outdoor unit stops.
		ON	Operation stops. 9 minutes later, check code “P8” appears on remote controller display.
	HEAT	OFF	Operation stops.
		ON	Operation stops. 27 minutes later, check code “P8” appears on remote controller display.
	COOL	OFF	Outdoor unit stops.
		ON	Operation stops. 9 minutes later, check code “P8” appears on remote controller display.
	HEAT	OFF	Operation stops.
		ON	Operation stops, 27 minutes later, check code “P8” appears on remote controller display.
	COOL	OFF	Outdoor unit stops.
		ON	Operation stops. 9 minutes later, check code “P8” appears on remote controller display.
	HEAT	OFF	Operation stops.
		ON	Operation stops. 27 minutes later, check “P8” appears on remote controller display.
Disconnection between 1 and 1 or 2 and 2.	COOL	OFF	Operation stops.
		ON	Operation stops. 9 minutes later, check code “P8” appears on remote controller display.
	HEAT	OFF	Operation stops. 4-way valve turns OFF.
		ON	27 minutes later, check code “P8” appears on remote controller display.
Disconnection between 3 and 3.	COOL	—	Normal operation.
	HEAT	OFF	Operation stops. 4-way valve turns ON.
		ON	Operation stops. 27 minutes later check code “P8” appears on remote controller display.

7. OTHER TROUBLES AND CAUSES


Vanes do not work.
Vane motor does not work.
Limit swtich does not work.
Connector is poorly connected.
Vane motor is poorly assembled.
Indoor controller board is damaged.
Vane motor is damaged.
Vane motor relay is damaged.
Limit switch is damaged.
The size of the cam is wrong.
Unit stops after 5 to 20 seconds operation
Protection function is working.
Refer to check code on remote controller display. See page 45.
Air discharge display is OFF and button does not operate.
In this case, remote controller is normal.
Indoor controller board deems the auto vanes are not attached to the unit.
Horizontal anlgle can not be detected.
Indoor controller is damaged.
Dip switch setting is wrong.
Indoor controller is damaged.
Vane motor is damaged.
Vane motor limit switch is poorly connected.
Auto vane is wired after power is turned to ON.
Vane motor limit switch is damaged.
Vane motor is damaged.
Poorly connected
Disconnected
Power ON/OFF button is not available.
Beep sound is heard, but display is turned OFF.
Beep sound is not heard, and display remains OFF.
"CENTRALLY CONTROLLED" is displayed.
Indoor/outdoor connecting wire is connected incorrectly.
Indoor/outdoor connecting wire shorts.
Compressor protector is damaged.
Deicer is broken.
Remote controller is damaged.
Transmission wire is poorly connected
Transmission wire is damaged.
Connector is poorly connected.
Indoor terminal block is poorly connected.
Remote controller terminal block is poorly connected.

8.MR. SLIM/LOSSNAY INTERLOCK OPERATION

<Symptoms that are not malfunctions>

If any of the following symptoms occur, they are not malfunctions.

Symptom	Cause
LOSSNAY control switch does not work.	LOSSNAY control switch can not work during interlock operation. LOSSNAY control switch is effective only while Mr. SLIM is not operating.
LOSSNAY air speed can not be controlled in interlock operation.	LOSSNAY fan speed is fixed to HIGH during interlock operation. LOSSNAY fan speed LOW/HIGH can be switched only during LOSSNAY individual operation with the LOSSNAY contorl switch.

For LOSSNAY, troubleshooting refer to the LOSSNAY technical & service manual.

11 4-WAY AIR FLOW SYSTEM

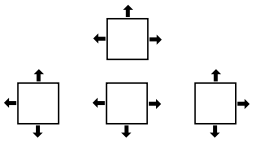
1.Placement of the air outlets

●For this grill, the airflow direction comes in 5 patterns.

Also, by setting the dipswitches (SWA and SWB)on the indoor board to the appropriate settings, you can adjust the air flow and speed. Select the settings that are needed from those in Tables 2 and 3 according to the place where you want to install the unit.

1) Decide on the pattern of the airflow direction.

<Table 1>

Airflow direction pattern	4-direction	3-direction
	Pattern 1 Factory setting	Pattern 4 One air outlet fully closed
		

Note 1. For the 3-direction airflow, install the air outlet shutter plate(PAC-SF38SP-E)

Note 2. The 2-direction airflow is unavailable.

2) According to the number of air outlets and the height of the ceiling to install the unit, be sure to set the dip switches (SWA, SWB, SWC) on the indoor board to the appropriate setting.

●Correspondence of ceiling heights to numbers of air outlets.

<Table 2>

SWB \ SWA	① Silent	② Standard	③ High ceiling
4-directional	2.4m	2.7m	3.0m
3-directional	2.7m	3.0m	3.3m

<Initial setting by factory>

SWA : for ceiling height
3···High ceiling
ter element

SWB : for number of air outlets
2···(Unavailable)

SWC : optional filter element
STD···Without filter element
2···Standard 3···3 directions OP···With fil-

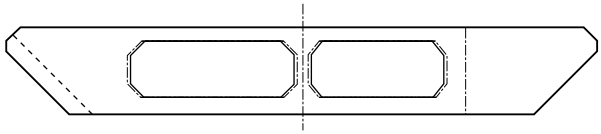
2.Installing the outlet shutter plate (PAC-SF38SP-E)

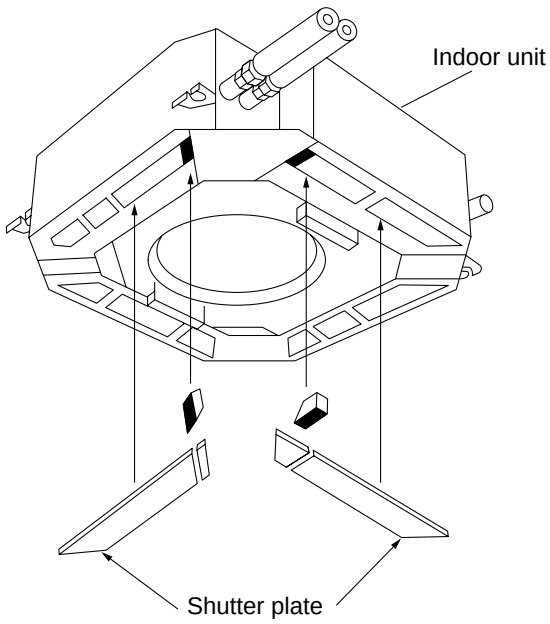
For the 3-direction airflow, close one air outlet fully by installing the air outlet shutter plate before installing the grill.

<**Caution**> Installing the shutter plate not securely will cause air leak and water dripping.

<**How to attach the shutter plate**>

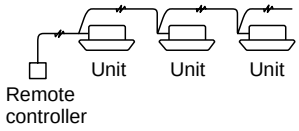
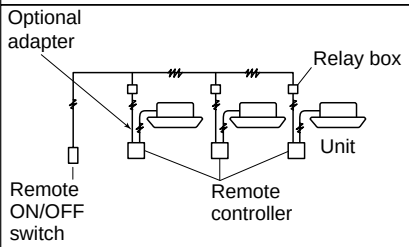
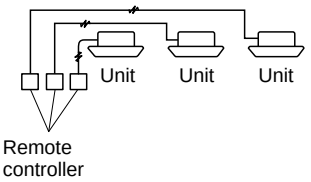
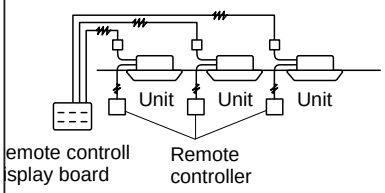
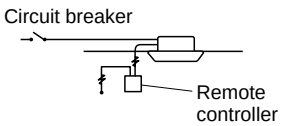
Peel off the separation sheet from the shutter plate, and attach the shutter plate to the air outlet of the indoor unit.





12 SYSTEM CONTROL

1. VARIETY OF SYSTEM CONTROL FUNCTIONS

1 Group control with a single remote controller (See page 53.)		Many units, installed at different locations, can be started and controlled with a aingle remote controller. The remote controller can be mounted in a different location using a non-polar two-wire cable, which can be extended up to 500m. A maximum of 50 units can be controlled with a single remote controller. All units operate in the same mode.
2 Both remote ON/OFF and individual controls (See page 54.) ※ Timer adapter (PAC-SA89TA-E) is needed.		All units can be turned on or off simultaneously using a remote ON-OFF switch. Also, each unit can be controlled individually by each remote controller. Duning remote ON-OFF control, a message of “CENTRALLY CONTROLLED” is displayed on the LCD of the remote controller. This is available for both one unit control and several units control.
3 Individual control by grouping remote controllers (See page 55.)		By grouping the remote controllers in one place, several units installed at different locations can be controlled individually, and operation conditions of all units are visible without a special control board. The control method is the same as that of the single unit with a single remote controller.
4 Multiple remote control display (See page 55.) ※ Multiple display adapter (PAC-SA88HA-E) is needed.		Several units can be controlled with a remote control display board. Operation conditions of all the units are visible with the remote control display board. Individual control by each remote controller is also possible.
5 Auto restart function (See page 56.)		A unit can be started or stopped with the circuit breaker on or off. Remote controller is also available. With this function, when the power is restored aftar power failure, the unit will restart automatically. (However, when the remote controller POWER ON/OFF button is OFF, the unit will not start.)

2. GROUP CONTROL WITH A SINGLE REMOTE CONTROLLER

A maximum of 50 units can be started in order according to the dip switch settings.

2-1 How to wire

(1) Connect the remote controller to the double terminal block on the indoor controller board of the master unit (No.0 unit). (See Figure 1.)
(2) Connect the double terminal block of the master unit to the double terminal block of No.1 unit.
(3) Connect the double terminal block of No.1 unit to the double terminal block of No.2 unit.
(4) Continue the process until all the units are connected with two-wire cables. (See Figure 2.)
(5) Remove the connector CN40 from the indoor controller board of each unit except the master unit. (See Figure 3.)
(6) Set the unit-address of esch unit with SW2 on the indoor controller board following the instructions below.

2-2 How to set unit-address

The unit-address also serves as a successive-start timer which starts each unit at intervals of 1 second. If two or more units have the same unit-address in a group control, operation stops due to system error. Be sure to set SW2 correctly following the instructions below.

(1) Each lever of SW2 shows the number as follows.
SW2-1 : 1 SW2-4 : 8
SW2-2 : 2 SW2-5 : 16
SW2-3 : 4 SW2-6 : 32
(2) Total number of levers turned to ON shows the address of the unit.
For example, to set No.3 unit, turn ON SW2-1 and SW2-2.
(3) In this way, set from the. master unit to the last unit.
Do not forget to set the master (No. 0) unit.

Figure 1

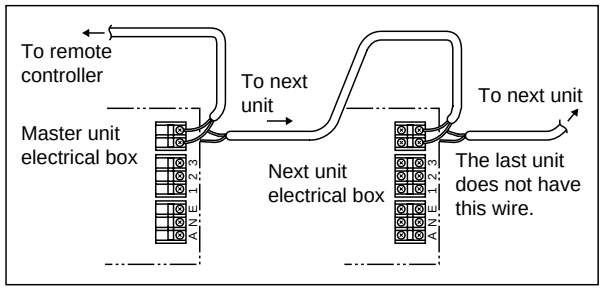

To remote controller
To next unit
To next unit
Master unit electrical box
Next unit electrical box
The last unit does not have this wire.
A N E 1 2 3

Figure 2

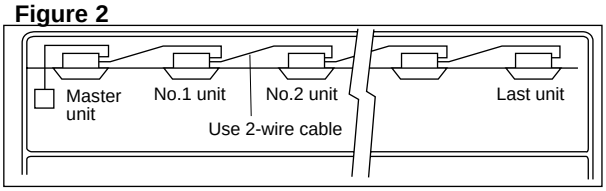
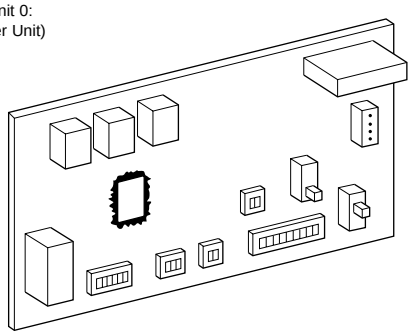


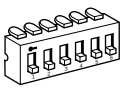
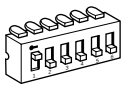
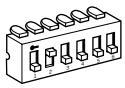
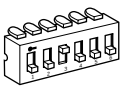
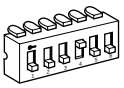
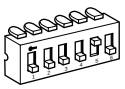
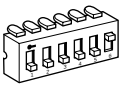
Figure 3

Indoor controller board ▼

Should be removed from all units other than unit 0: (Master Unit)



Setting examples

	Master (No. 0) unit	No. 1 unit	No. 2 unit	No. 4 unit	No. 8 unit	No. 16 unit	No. 32 unit
SW2	ALL OFF 	1 ON 	2 ON 	3 ON 	4 ON 	5 ON 	6 ON 
Unit address & start delay in seconds.	0	1	2	4	8	16	32

2-3 Unit control

The remote controller can control all units ON/OFF, temperature,air flow, and swing louver. However, the thermostat in each unit turns ON or OFF individually to adijust to the room temperature.

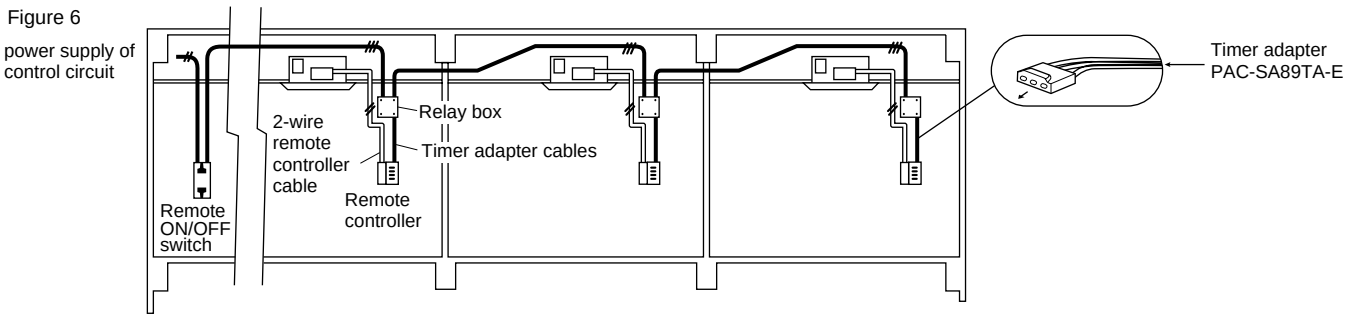
3. REMOTE ON-OFF AND INDIVIDUAL REMOTE CONTROLS

This method is available to control one unit or any number of units.
The following operations are available by connecting a relay, a timer adapter (PAC-SA89TA-E), and a remote ON/OFF switch to the system. Timer adapter is an optional part. Other parts are available on the market.
(A) To start all units in order by remote ON-OFF switch
(B) To stop all units simultaneously by remote ON-OFF switch
(C) To switch between the remote ON-OFF control and the individual remote control

3-1 System

Figure 6 shows the case of three units.The same is the case with any number of units.

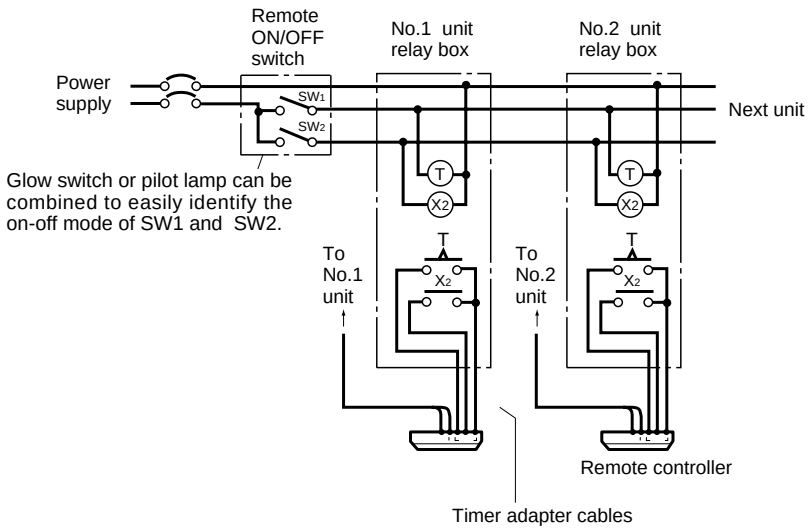
Figure 6



NOTE1 : Install the relay box where you can be serviced it easily.
NOTE2 : For control circuit wiring, use a wire of No. 14 AWG or a control cable according to the power supply of control circuit.
NOTE3 : When the power supply of the control circuit is 220/240V AC,
- ● Do not connect the control circuit wire to the remote controller cable directly.
- ● Do not place the control circuit wire and the remote controller cable into the same conduit tube.

3-2 Basic wiring

Caution : Before starting all units simultaneously by the remote ON-OFF switch, be sure to connect a sequence-start timer into the remote ON-OFF circuit. Otherwise, a rush of starting current may damage the power supply.



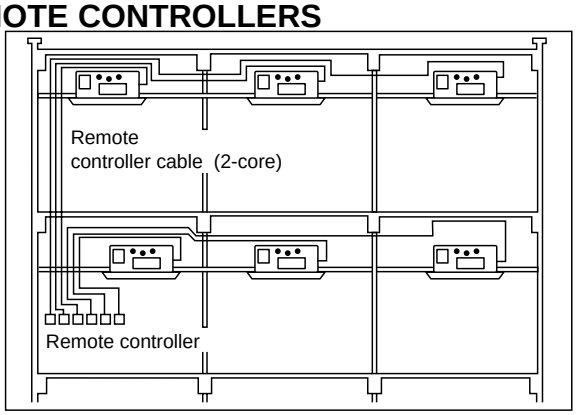
3-3 Switch function of remote ON-OFF switch

		SW2 (Switches between remote ON-OFF and individual control)	
		ON (Remote ON-OFF control)	OFF (Individual control)
SW1 (Switches between remote ON and OFF.)	ON (Start)	All units start together. ※1 Individual control is not available.	Each unit can be controlled by each remote controller. Remote ON-OFF switch is not available.
	OFF (Stop)	All units start together. ※2 Individual control is not available.	

※1After all units start together, if SW2 is turned OFF, each unit can be individually stopped by each remote controller.
※2After all units stop together, if SW2 is turned OFF, each unit can be individually started by each remote controller.

4. INDIVIDUAL CONTROL BY GROUPING THE REMOTE CONTROLLERS

- Grouping the remote controllers allows individual control and centralized monitoring of units installed in different places without a special control board.
- Remote control cables are extendable up to 500m. When the cable length exceeds 12m, use the double-insulated two-care cable such as Belden 9407. Also, the cable thickness must be No. 22 AWG or above.
- When gathering the power ON/OFF switches of air conditioners near the remote controllers, you should also install the power ON/OFF switch near each unit to prevent electric trouble during servicing.



5. MULTIPLE REMOTE CONTROL DISPLAY

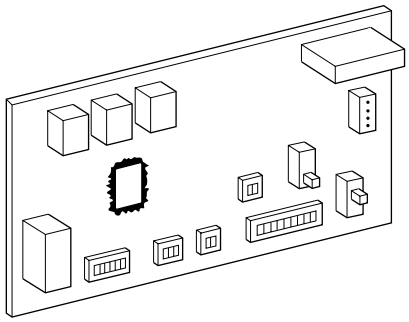
You can control serveral units with a multiple remote control display, by wiring an optional multipe display adapter (PAC-SA88HA-E) with relays and lamps on the market.

5-1 How to wire

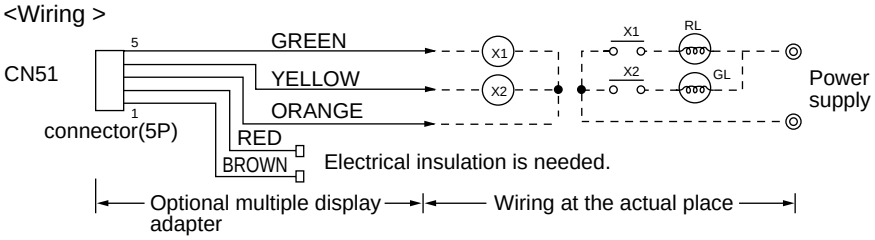
(1) Connect the multipe display adapter to the connector CN51 on the indoor controller board.

(2) Wire three of the five wires from the multiple display adapter as shown in the figure below.

Indoor controller board▼

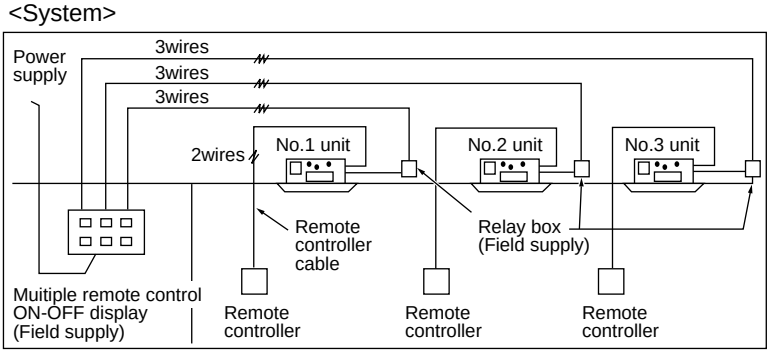


<Wiring >



The maximum distance between indoor board and relay is 10m.

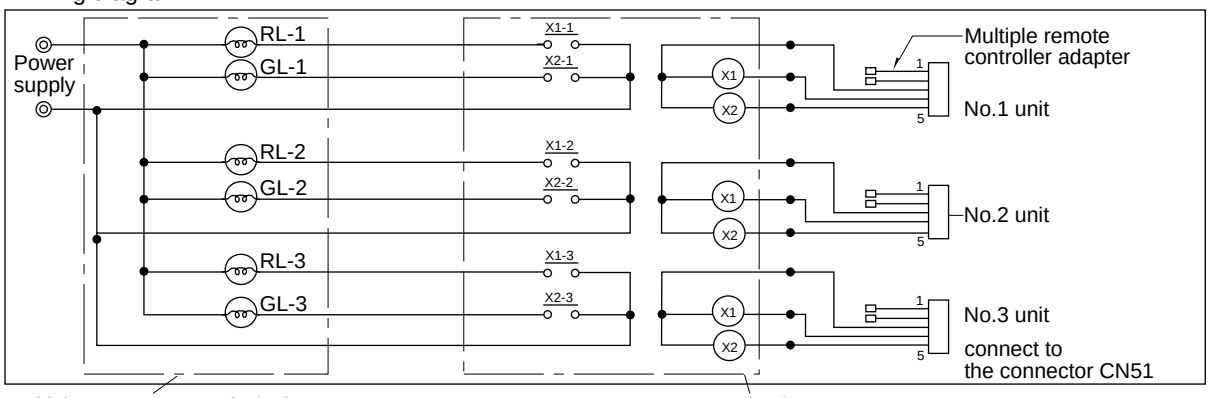
<System>



(Operation check)

[Notes on Signs]
X1:Relay (for check lamp)
X2:Relay (for operation lamp)
RL:Check Lamp
GL:Operation Lamp
[Field supplied parts]
Relays:12V DC with rated coil power consumption below 0.9W.
Lamps:Matching to power supply voltage.

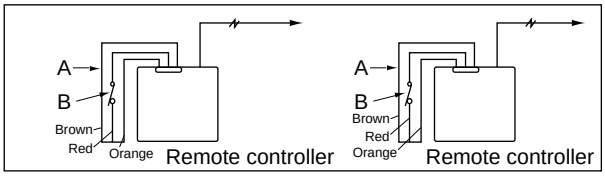
<Wiring diagram>



6. AUTO RESTART FUNCTION

By setting the dipswitch SW1-10 to ON, the air conditioner can be started/stopped by power supply ON/OFF.
If the air conditioner is OFF before the power failure, it will not start operation by power restore.

<Wiring>



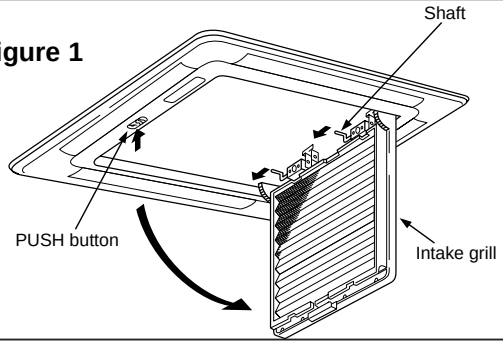
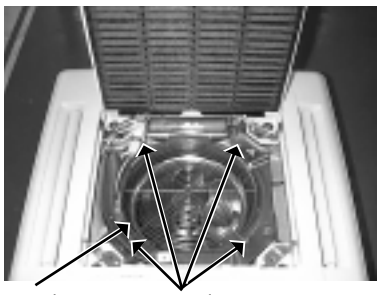
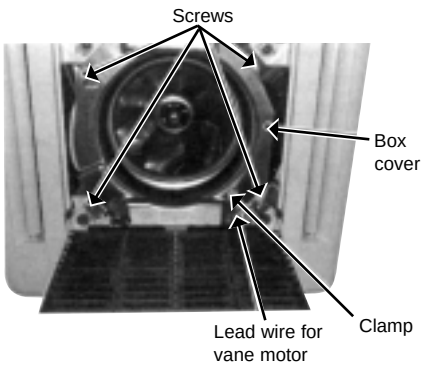
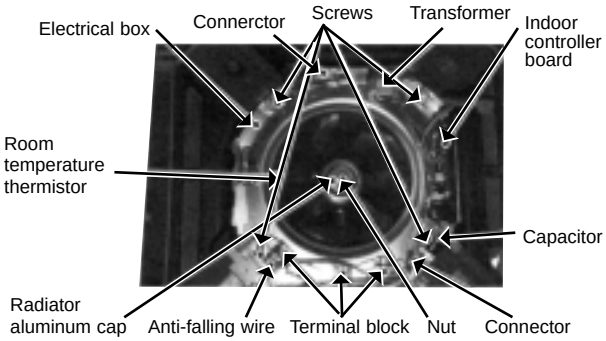
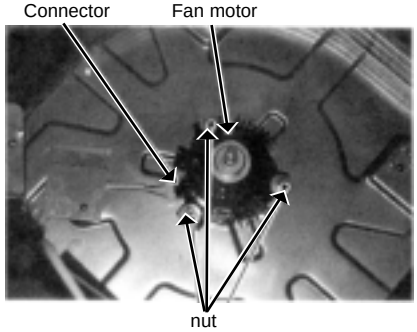
A : an optional timer adapter
B : a single-throw switch

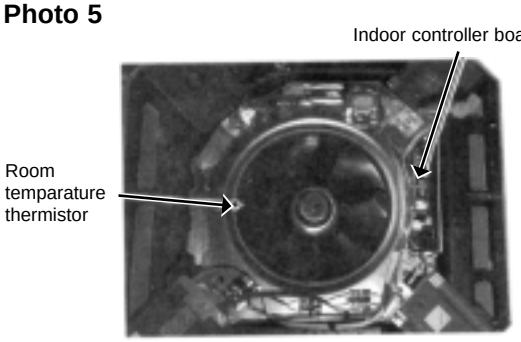
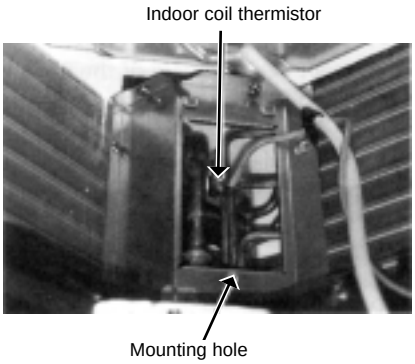
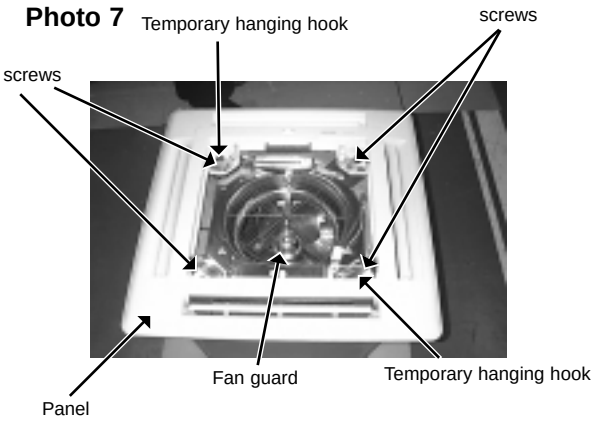
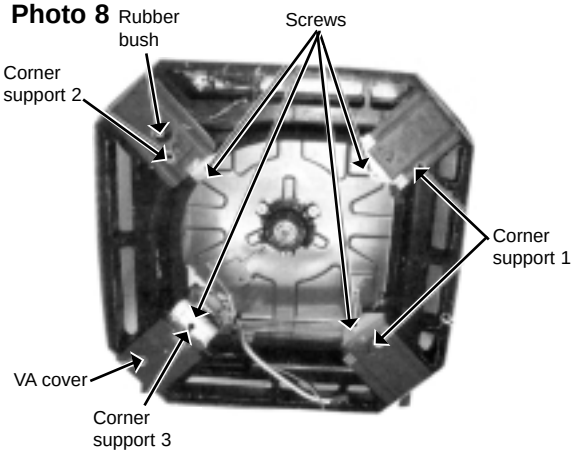
For remote control, connect the optional timer adapter (PAC-SA89TA-E)

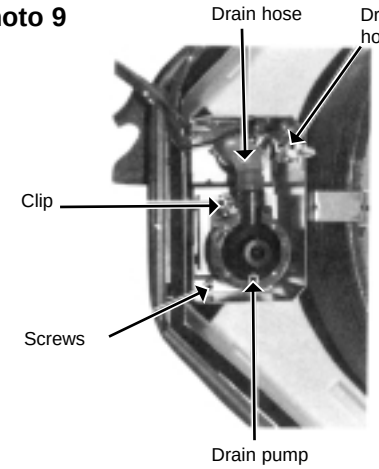
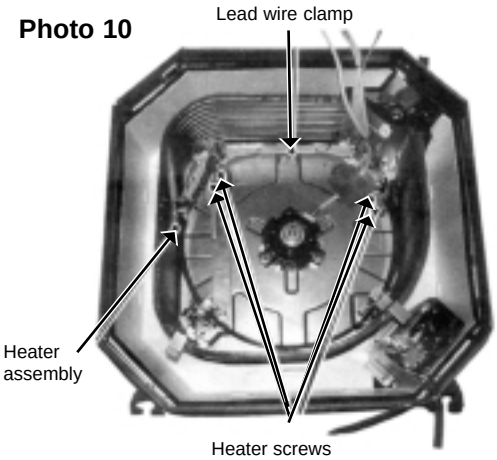
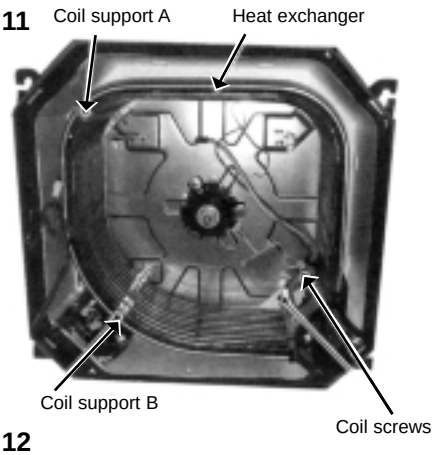
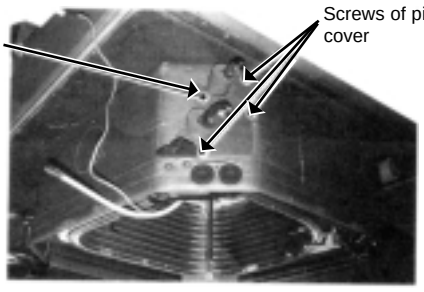
13 DISASSEMBLY PROCEDURE

1. INDOOR UNIT

Be careful on removing heavy parts.

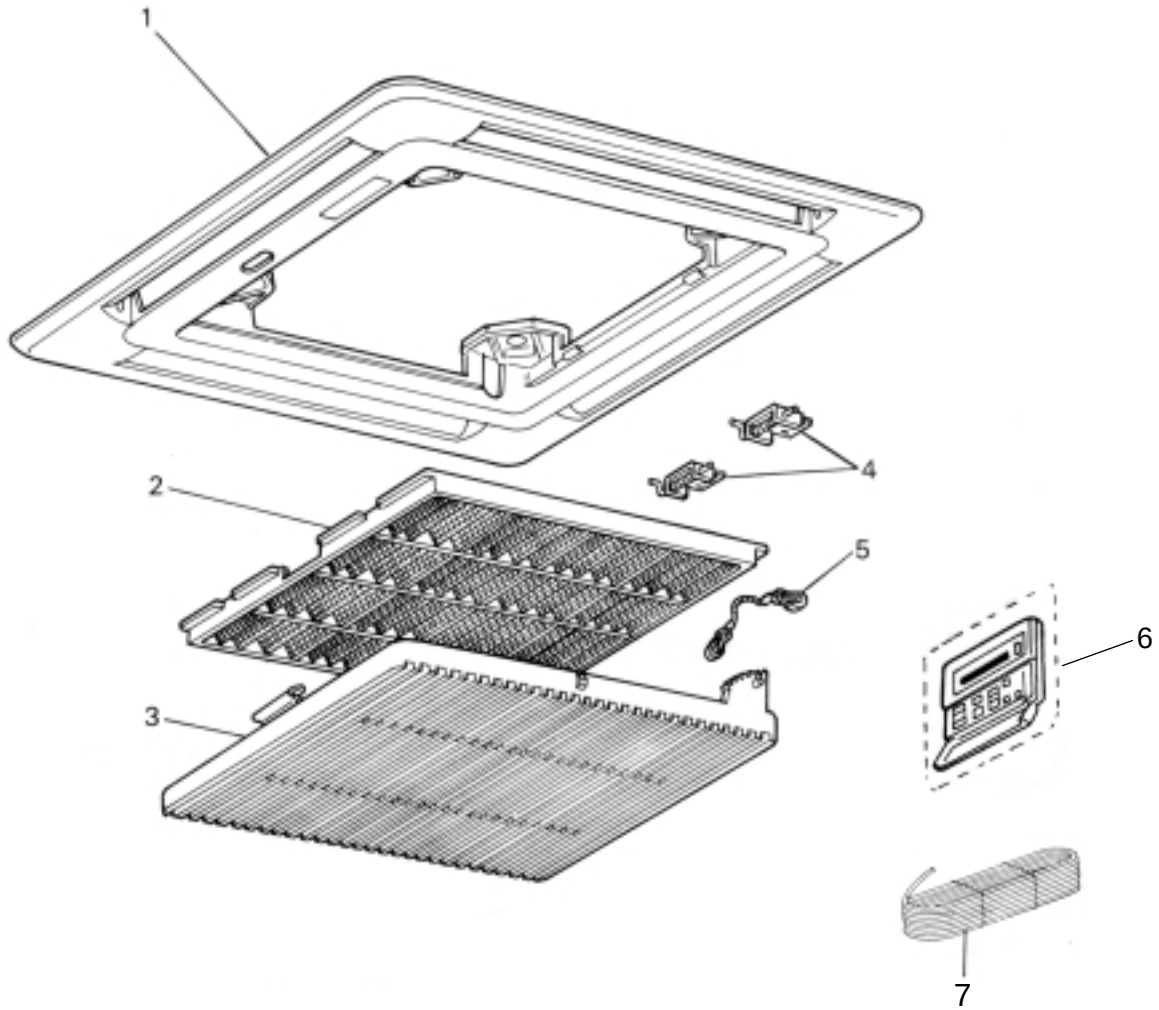
OPERATING PROCEDURE	PHOTOS&ILLUSTRATIONS
1. Removing the air intake grill (1) Press the PUSH button. (2) Open the intake grill 90°. (3) Remove the chip. (4) Slide the shaft in the hinge to the left and remove the intake grill.	**Figure 1** 
2. Removing the fan guard. (1) Open the intake grill. (2) Remove the 4 screws of the fan guard.	**Photo 1** 
3. Removing the electrical parts box (1) Remove the fan grand. (2) Disconnect the lead wire of the vane motor from the clamp, and disconnect the red connector (8P). (3) Remove 2 of 4 screws from the electorical parts cover. (4) Remove the electorical parts cover. (5) Disconnect the following connectors from the box. Red (3P) for the fan motor White (2P) for the indoor coil trermistor Blue (2P) for the drain pump White (4P) for the drain sensor (6) Disconnect the green anti-falling wire of the electrical parts box. (7) Remove 3 of 4 screws from the electrical parts box, and loosen the other screw. (8) Pull out the electrical parts box. Electrical parts inside the box Terminal block Transfomer Indoor fan capacitor Room temperature thermistor Indoor controller board	**Photo 2**  **Photo 3** 
4. Removing the fan motor (1) Remove the fan guard. (2) Remove the turbo-fan nut and radiator aluminum cap. (3) Pull out the turbo fan. (4) Disconnect the connector of the fan motor lead wire. (5) Remove the 3nuts of fan motor.	**Photo 4** 

OPERATING PROCEDURE	PHOTOS&ILLUSTRATIONS
5. Removing the room temperature thermistor (1) Remove the fan guard. (2) Remove the electrical box cover (3) Remove the holder and the room temperature thermistor by pulling the catch. (4) Disconnect the red connector, CN20, on the indoor controller board.	**Photo 5** 
6. Removing the indoor coil thermistor (1) Remove the fan guard. (2) Remove the electrical box cover. (3) Remove the electrical box. (4) Remove the turbo fan. (5) Remove the screw of the service panel. (6) Remove the service panel. (7) Remove the indoor coil thermistor from the holder attached to the copper pipe. (8) Disconnect the 2-pin white connector.	**Photo 6** 
7. Removing the panel (1) Open the intake grill. (2) Disconnect the connector the vane motor. (3) Remove 4 screws of the panel. (4) Pulling the temporary handing hook, remove the panel.	**Photo 7** 
8. Removing the drain pan (1) Remove the panel. (2) Remove the fan guard. (3) Remove the rubber bushing. (4) Drain the remaining water in the drain pan. (5) Remove the electrical box cover. (6) Remove the electrical box. (7) Refmove the screw of the V.A. cover, and remove the V.A. cover. (8) Remove each screw of the corner supports 1,2, and 3, and remove the corner supports 1,2 and 3. (9) Pull out the drain pan. ※Pull the left and right of the pan gradually. Be careful not to crack or damage the pan.	**Photo 8** 

OPERATING PROCEDURE	PHOTOS&ILLUSTRATIONS
9. Removing the drain pump and drain sensor (1) Remove the panel. (2) Remove the fan guard. (3) Remove the electrical parts cover. (4) Remove the electrical parts box. (5) Remove the drain pan. (6) Remove 4 screws of the drain pump. (7) Pulling the clip of the drain hose, pull out the drain hose from the drain pump. (8) Remove the drain senser and the holder. (9) Pull out the drain pump.	**Photo 9** 
10. Removing the heater (for the only PLH-1.6/2/2.5KKHC) (1) Remove the panel. (2) Remove the fan guard. (3) Remove the electrical parts cover. (4) Remove the electrical parts box. (5) Remove the drain pan. (6) Remove the turbo fan. (7) Remove the 5 screws of the hearter assembly. (8) Remove the clamp (1 screw) securing the lead wire. (9) Pull the heater assembly out.	**Photo 10** 
11. Removing the heat exchanger (1) Remove the panel. (2) Remove the fan guard. (3) Remove the electrical parts cover. (4) Remove the electrical parts box. (5) Remove the drain pan. (6) Remove the turbo fan. (7) Remove the screw of the coil support A. (8) Remove 2 screws of the coil support B. (9) Remove 2 screws of the coil. (10) Remove 4 screws of the piping cover of the outer wall, and pull out the piping cover.	**Photo 11**  **Photo 12** 

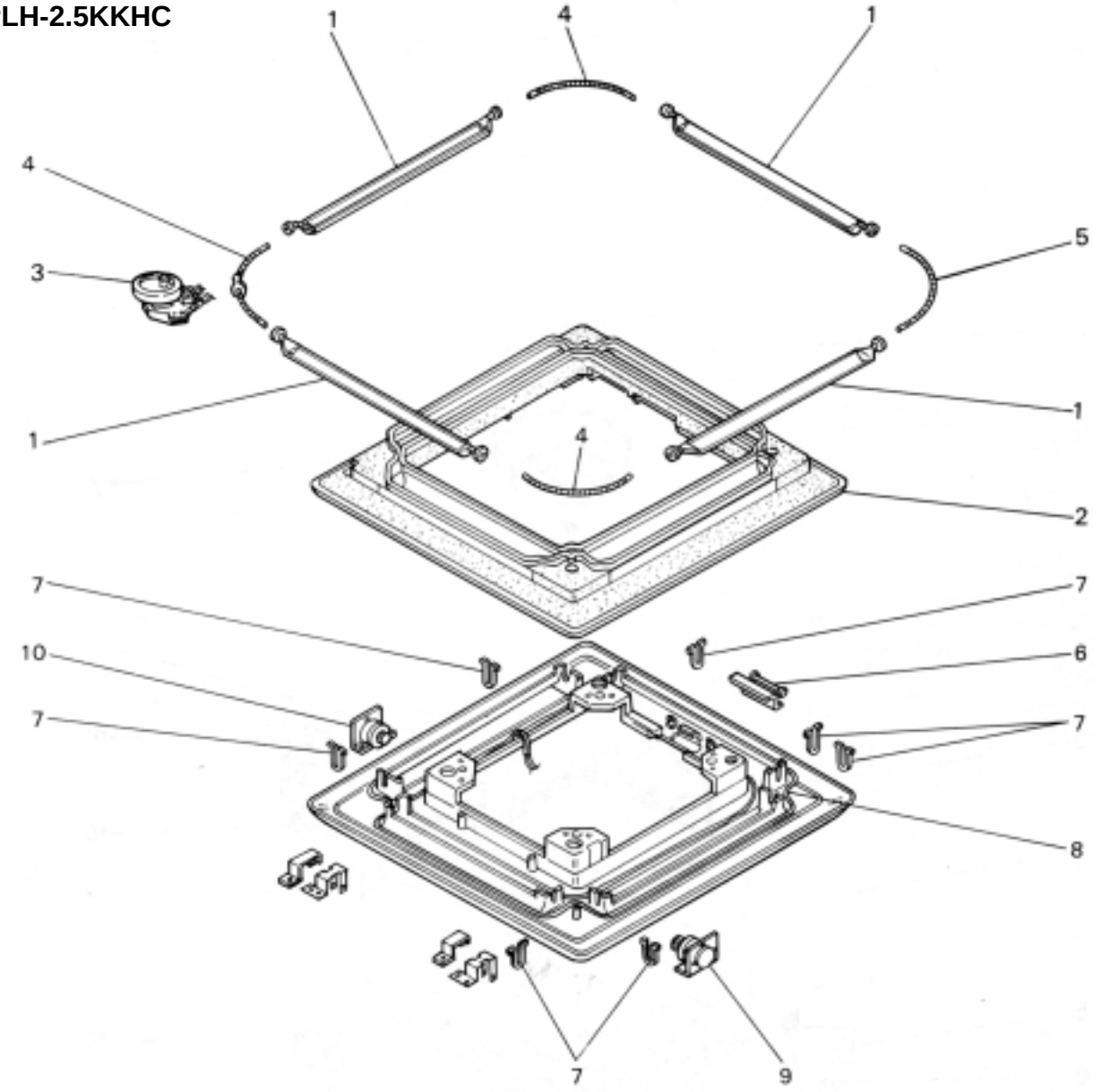
14 PARTS LIST

PANEL PARTS
PLH-1.6KKHC
PLH-2KKHC
PLH-2.5KKHC



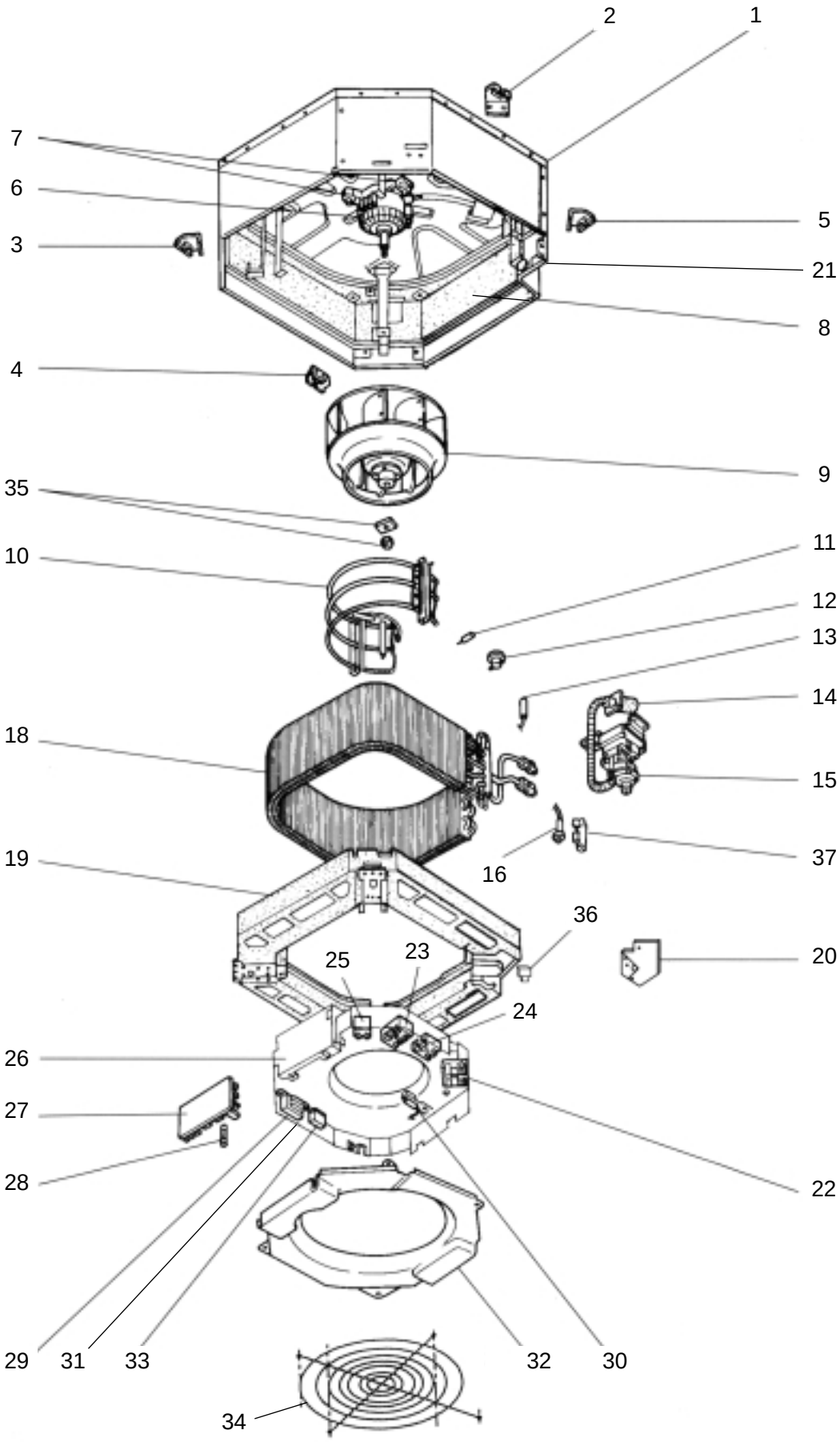
No.	Part No.	Part Name	Specification	Q'ty/set PLH-1.6/2./2.5 KKHC	Remarks (Drawing No.)	Wiring Diagram Symbol	Recommended Q'ty	Price Unit	Price Amount
1	T7W 560 003	AIR OUTLET GRILLE		1					
2	R01 29H 500	AIR FILTER		1					
3	R01 29H 691	INTAKE GRILLE		1					
4	R01 29H 061	HINGE		2					
5	—	GRILLE HANGER		1	(BG88H096H01)				
6	T7W 14K 200	REMOTE CONTROLLER		1		R.B			
7	T7W 556 305	REMOTE CONTROLLER CABLE	12m	1					

PANEL PARTS
PLH-1.6KKHC
PLH-2KKHC
PLH-2.5KKHC



No.	Part No.	Part Name	Specification	Q'ty/set PLH-1.6/2./2.5 KKHC	Remarks (Drawing No.)	Wiring Diagram Symbol	Recommended Q'ty	Price Unit	Price Amount
1	R01 29H 002	AUTO VANE		4					
2	R01 29H 085	AIR GUIDE		1					
3	R01 29H 223	VANE MOTOR		1		MV			
4	R01 29H 063	SPRING JOINT 1		1	<3/SET>				
5	T7W 33K 063	SPRING JOINT		1					
6	R01 29H 056	PUSH BUTTON		1					
7	R01 29H 047	VANE SUPPORT		8					
8	T7W 560 258	CORD HEATER	240V 28.2W	1		H			
9	R01 29H 040	GRILLE GEAR (RIGHT)		1					
10	R01 29H 041	GRILLE GEAR (LEFT)		1					

FUNCTIONAL PARTS
PLH-1.6KKHC
PLH-2KKHC
PLH-2.5KKHC



Part numbers that are cicled are not shown in the figure.

No.	Part No.	Part Name	Specification	Q'ty/set			Remarks (Drawing No.)	Wiring Diagram Symbol	Recom-mended Q'ty	Price	
				PLH-1.6	PLH-2	PLH-2.5				Unit	Amount
				KKHC							
1	—	BASE		1	1	1	(BG02Y348G06)				
2	—	LEG		1	1	1	(BG00T672G08)				
3	—	LEG		1	1	1	(BG00T672G09)				
4	—	LEG		1	1	1	(BG00T672G10)				
5	—	LEG		1	1	1	(BG00T673G02)				
6	T7W E00 762	FAN MOTOR	PAI-V30F	1	1	1		MF1			
7	R01 29H 105	MOTOR MOUNT		3	3	3					
8	—	INNER COVER		1	1	1	(BG00T718G06)				
9	R01 41N 114	TURBO FAN		1	1	1					
10	T7W E00 300	HEATER ELEMENT	467W 240V	3	3			H1			
	T7W E01 300	HEATER ELEMENT	700W 240V			3		H1			
11	R01 32K 706	THERMAL FUSE	77°C 250V 10A	1	1	1		FS1			
12	R01 046 700	THERMAL SWITCH	OFF42°C ON32°C	1	1	1		26H			
13	R01 08K 202	INDOOR COIL THERMISTOR		1	1	1		RT2			
14	R01 41N 523	DRAIN SOCKET		1	1	1					
15	T7W E00 355	DRAIN PUMP		1	1	1		DP			
16	R01 W28 266	DRAIN SENSOR		1	1	1		DS			
⑰	R01 W28 527	DRAIN HOSE		1	1	1					
18	T7W E00 480	HEAT EXCHANGER		1							
	R01 E01 480	HEAT EXCHANGER			1						
	R01 E02 480	HEAT EXCHANGER				1					
19	R01 E00 529	DRAIN PAN		1	1	1					
20	—	CORNER COVER		1	1	1	(BG00T713G05)				
21	—	COVER (DRAM)		1	1	1	(BG00T712G06)				
22	T7W 521 716	TERMINAL BLOCK	3P(L,N,⏚)	1	1	1		TB2			
23	T7W 517 716	TERMINAL BLOCK	3P(1,2,3)	1	1	1		TB4			
24	T7W 515 716	TERMINAL BLOCK	2P(1,2)	1	1	1		TB5			
25	R01 29H 255	CAPACITOR	2.5μF 400V	1	1	1		C1			
26	—	CONTROLLER CASE		1	1	1	(BG25J542H04)				
27	T7W 58K 310	INDOOR CONTROLLER BOARD		1	1	1		I.B			
28	T7W 520 239	FUSE	250V 6.3A	1	1	1		F1<I.B>			
29	T7W 580 799	TRANSFORMER		1	1	1		T			
30	R01 J07 202	ROOM TEMPERATURE THERMISTOR		1	1	1		RT1			
31	—	BELL MOUTH		1	1	1	(BG00L601G22)				
32	—	ELECTRICAL PARTS COVER		1	1	1	(BG00A662G18)				
33	R01 71G 215	RELAY	LY2F DC12V	1	1	1		88H			
34	T7W 29H 675	FAN GUARD		1	1	1					
35	R01 08K 097	SPL WASHER		1	1	1					
36	R01 A48 524	DRAIN PLUG		1	1	1					
37	R01 71N 241	SENSOR HOLDER		1	1	1					
㊳	R01 20J 303	INSULATOR		1	1	1					

15 OPTIONAL PARTS

1. REFRIGERANT PIPES

Service Ref. : PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC

Part No.	PAC-05FFS	PAC-07FFS	PAC-10FFS	PAC-15FFS
Pipe length	5m	7m	10m	15m
Pipe size O.D.	Liquid:ϕ9.52 Gas:ϕ15.88			
Connection methed	Indoor unit:Flared Outdoor unit:Flared			

Note 1. How to connect refrigerant pipes.
Factory supplied optional refrigerant pipings contain refrigerant at the above atmospheric pressures. As long as the connection takes no more than 5 minutes, no air will enter, and there will be no need for air purging.
Remove the blind caps and make the connections within 5 minutes. After the connections for the indoor and outdoor units are made, open the stop valve on the outdoor unit to allow refrigerant gas to flow.
If piping length exceeds 5m, an additional charge of refrigerant in needed.

Note 2. The following main parts are cntained in the optional refrigerant piping kit.
Heat insulating cover, vinyl tapes, nipples, sleeve and flange (for wall hole), connecting cables.

2. TIMER

Part No.	PAC-SC32PT (with set back function)
Model Name	Program timer

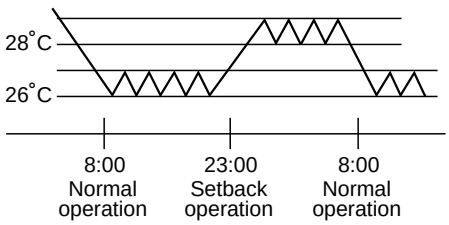
2-1 Program timer specifications

Part name	Program timer
Parts No.	PAC-SC32PTA
Exterior dimensions (inch)	5-4/32X4-23/32X23/32 (130X120X18mm)
Installation	Wall mount
Type of clock	Quartz
Clock accuracy	$\pm$50 second / month at 25℃
Display-Time	Liquid crystal display
-Week	Liquid crystal display
-Timer setting unit	Liquid crystal display
Program cycle	24 hours
Timer setting unit	30 minutes
No. of set points	48 / day
Power rating	5V DC $\pm$5% (Supplyed by Remote Controller)

2-2 Feature of program timer

(1) Daily timer function
Daily timer can be set in 30 minutes units for up to 24 hours.
Each unit can be set for unit ON, unit OFF, or setback operation.

(2) Setback operation (PAC-SK65PT)
Set back operation is useful for reducing running costs
e.g. At a hotel with a 24-hour system
8:00~23:00 Cooling operation with set temperature at 26°C
23:00~8:00 Setback operation with 2 degrees of setback
As shown in the chart on the right, the set temperature rises 2 degrees automatically during the setback operation. When the setback operation ends, normal operation will begin.

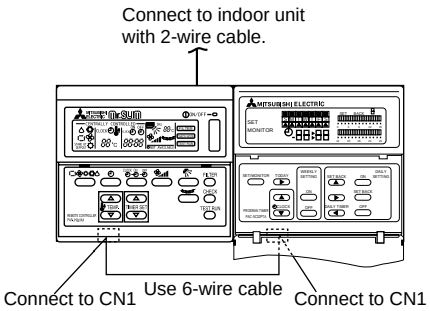


(3) Weekly timer function
Daily timer function can apply to each day of the week.

2-3. How to connect program timer

(1) Install the program timer next to the remote controller the same way as the remote controller is installed.

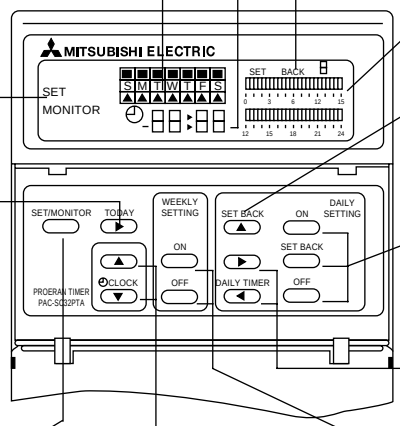
(2) Connect the program timer and the remote controller with a 6-wire cable as shown in the figure below



NOTE:While the program timer is connected to the remote controller, the 24hour ON/OFF timer on the remote controller will not operate.

2-4. Names and functions

<PAC-SC32PT>



WEEKLY TIMER SETTING DISPLAY

Used for selection of if or not the day operation pattern set by PATTERN SETTING is to be applied in weekly day unit, setting.

CURRENT TIME DISPLAY

During MONITOR status,current time is display.
During Daily timer setting, a time desire for timer setting is displayed.

SET BACK DISPLAY

Indicates the setting set back range.

DAILY TIMER SETTING DISPLAY

24 hours is divided into 48 blocks and each block express 30 minutes.
The block display consists of 3 pattern.

SET/MONITOR DISPLAY

During SET is display, clock adjustment, change of weekly day, daily and weekly timer setting can be performed.
During MONITOR is display, all switches except SET/MONITOR SW are invalidated. This is normal status.

Set back can be done in the range of 1,2,4,6 and 8°C.

SET BACK SETTING SW

Used for set back setting.

ON/SET BACK/OFF SW

Used to specify the time setting pattern.

WEEK DAY SETTING SW

Used for week day setting.

DAILY TIMER SW

Used for timer setting in 30 minutes unit.

MODE SELECTOR SW

Using this switch select “MONITOR” or “SET” Mode.

“MONITOR” :Indicates the current timer setting. All switch expect MODE SELECTOR SW are invalidated then.This is the normal status.

“SET”: Set to “SET” mode for clock adjustment, charge of week day, daily and weekly timer setting.

CLOCK ADJUSTMENT SW

Used for adjustment of the current time.

Push ▲ SW to advance the time. Each time the button is pushed the time advance by 1 minute, pushing continuously advances by 1 minute at 0.5 second interval, and when the lower digit of minute decomes 0 indication advances in 10 minutes unit.

▼ SW is used for reversing the time. Each time the button is pushed the time reverses by 1 minute, pushing continuously reverses the time by 1 minute at 0.5 second interval, and when the lower digit of minute decomes 0 indication reverses in 10 minutes unit.

WEEKLY TIMER SW

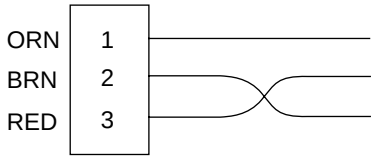
Used for setting timer in day of week unit.

Pushing ▶ SW moves the week day light display in order of
S → M → T → W ···
enabling to set the week day.

3. TIMER ADAPTER

This adapter is needed for system control and for operation via external contacts. Adapter connection is described on page 54.

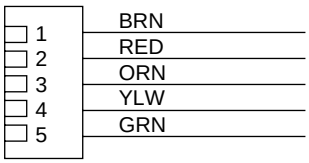
Part No.	PAC-SA89TA-E



4. MULTIPLE REMOTE CONTROLLER ADAPTER

This adapter is needed for remote indication (operation/check).

Part No.	PAC-SA88HA-E



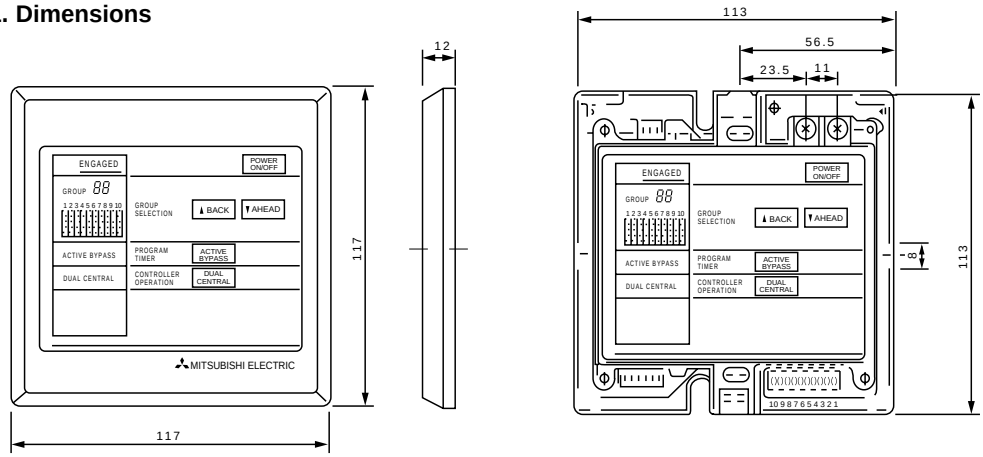
5. CENTRALIZED REMOTE CONTROLLER

Allows individual or combined control of up to 16 units. When using the PAC-805RC, the program timer adapter (PAC-825AD)is also needed. See page 68.

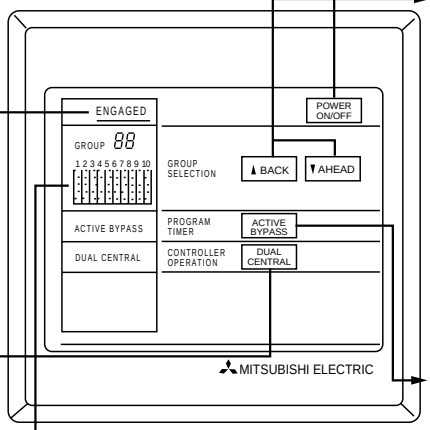
Part No.	PAC-805RC

5-1. Dimensions

Unit : mm



5-2. Functions



"ENGAGED" indicator
When this indicator is lit, transmission is in progress and all switches are inoperative.

DUAL/CENTRAL switch
This change-over switch governing the operation of the accessory remote controller.

"DUAL"
Instructions from both the accessory remote controller and the centralized remote controller are valid. (Priority given to the last instruction received.)

"CENTRAL"
ON/OFF switching by the accessory remote controller is invalidated. Control is by the centralized remote controller only.
Initial setting is "DUAL".

LCD Matrix Display
This display indicates the operational status of all connected units either by steady lighting or by flashing.

POWER ON/OFF switch
Operation ON/OFF switch.

▲BACK ▼AHEAD buttons
These buttons are used to designate the attached unit(s). (They designate the unit to be centrally controlled.)

●When group “00” is designated; collective ON/OFF instruction is sent to all units.

●When group “01”-“16“ is designated; ON/OFF instruction is sent to the designated units only.

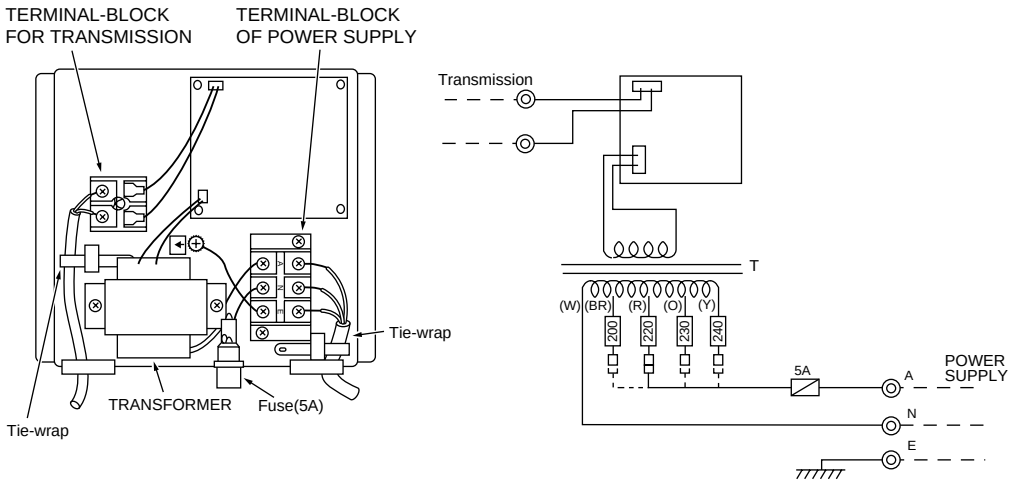
ACTIVE/BYPASS switch
This is a change-over switch for the program timer.
(It selects timer operation on the program timer.)
Use “BYPASS” when a program timer is not connected.
“ACTIVE”
The switch turns ON/OFF operational instructions from the program timer automatically.
“BYPASS”
ON/OFF Operation is by the centralized remote controller only.
Initial setting is “BYPASS”.

Independent “DUAL / CENTRAL” and “ACTIVE / BYPASS” setting of all the groups is possible. When the power supply to the centralized remote controller is cut due to power failure, all settings will return to original “DUAL” and “BYPASS”.

5-3 Connection method

(1) Connections in the power supply cord.

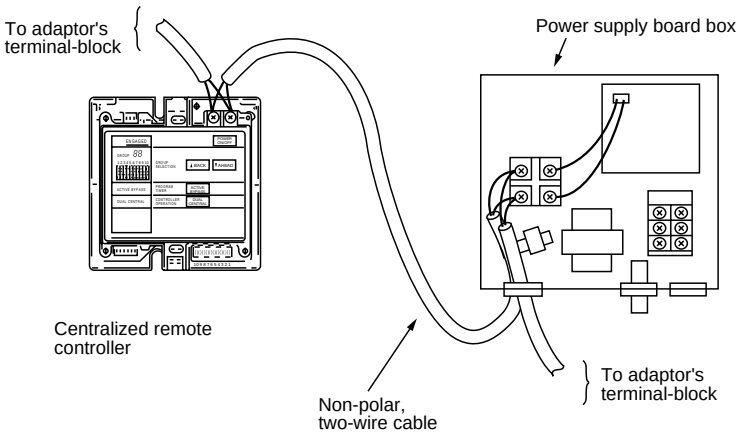
1. Connect the power supply cord to the power supply terminal-block and fix it in-place with a tie-wrap.
   Connect a single phase 200V AV (220, 230, 240V) to Ⓐ Ⓝ .
   As Ⓔ is the GND terminal, be sure to ground the earth wire.
2. Connect the transmission line to the transmission terminal-block and fix it in-place with a tie-wrap.
   Use a ϕ1.6 (AWG 14) or above two-wire cable for the transmission line.
   CAUTION : Never connect the power supply cord to the transmission terminal-block.



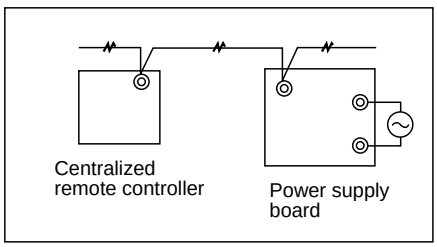
Wiring has to be changed when
a 200,230 or 240V power is used.

(2) Connection method of centralized remote controller and power supply board.

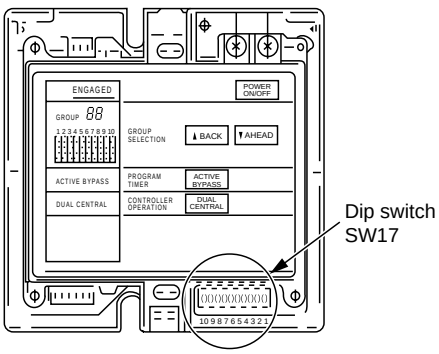
1. Connect the centralized remote controller and power supply board with a non-polar, two-wire cable.



2. Wiring diagram



3. Be sure to set the maximum address number with the dipswitch SW17 on the centralized remote controller.

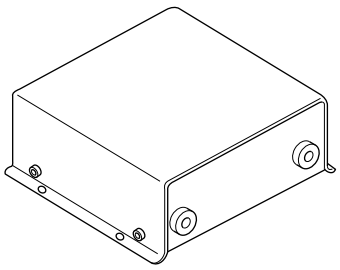
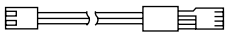
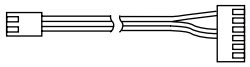
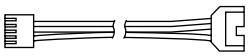
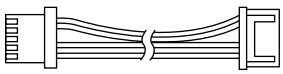


6. PROGRAM TIMER ADAPTER

This adapter is needed when a centralized remote controller(PAC-805RC)is used.

Part No.	PAC-825AD

6-1 Parts included

① ADAPTER ·····1P	② 3-core cable·····1P	③ 3-core cable·····1P
	 Length : 2m (6' 7")	 Length : 2m (6' 7")
	④ 4-core cable·····1P	⑤ 5-core cable·····1P
	 Length : 2m (6' 7")	 Length : 2m (6' 7")

6-2 Connection method

Connection and wiring methods differ with the type of the indoor unit used. Confirm the type before carrying out the work.

(1) Connections in the adapter box

1. Connect the power supply cord to the terminal-block and fix it in-place with a tie-wrap.
   Connect a single phase 200V (220, 230, 240V) AC to Ⓐ Ⓝ.
   As Ⓔ is the GND terminal, be sure to ground the earth wire.
2. Connect the transmission line to the transmission terminal-block and fix it in-place with a tie-wrap (when a centralized remote controller is being used).
   CAUTION : Never connect the power supply cord to the transmission terminal-block

Fig-1

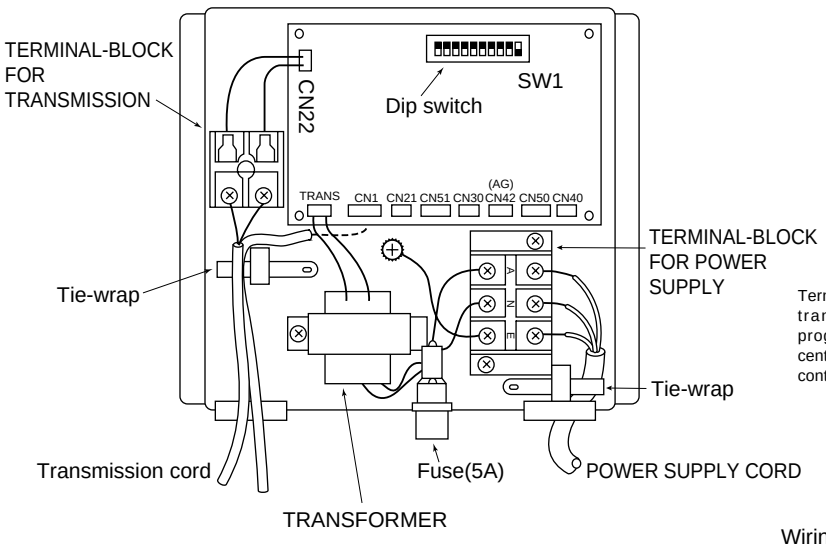
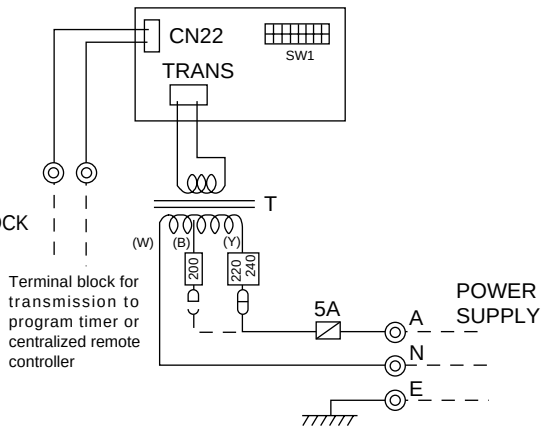


Fig-2

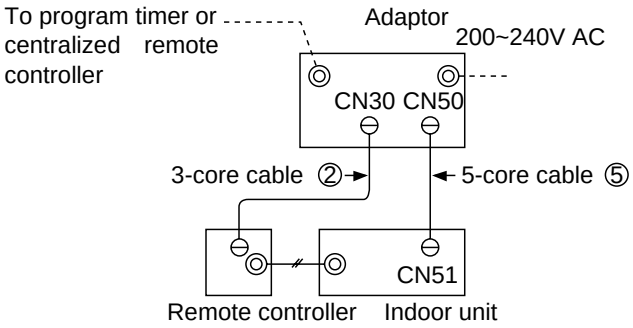


Wiring has to be changed when 200V power supply is used.

(2) When the centralized remote controller is used, set the address number with the dipswitch SW1 of the program timer adapter.

(3) Connections from adaptor

Fig.3

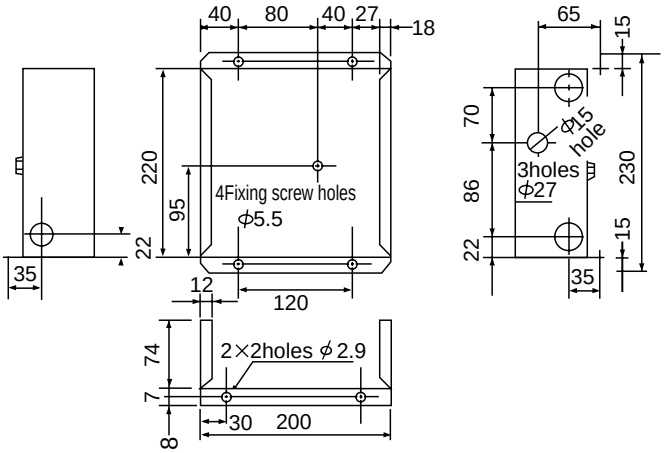


Max. length of each cable is 10m.

6-3 Dimensions

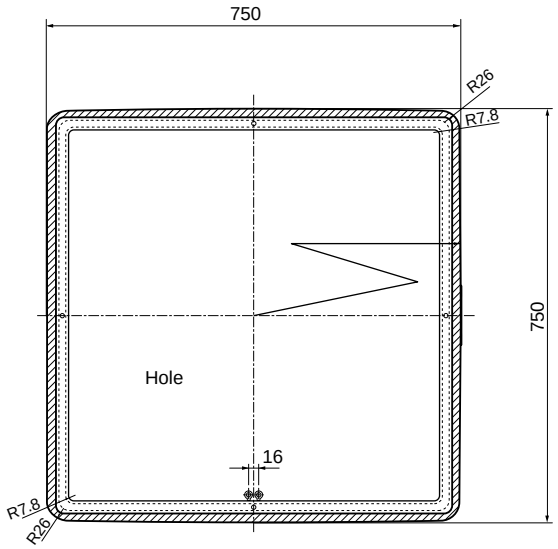
(Unit : mm)

Fig. 4



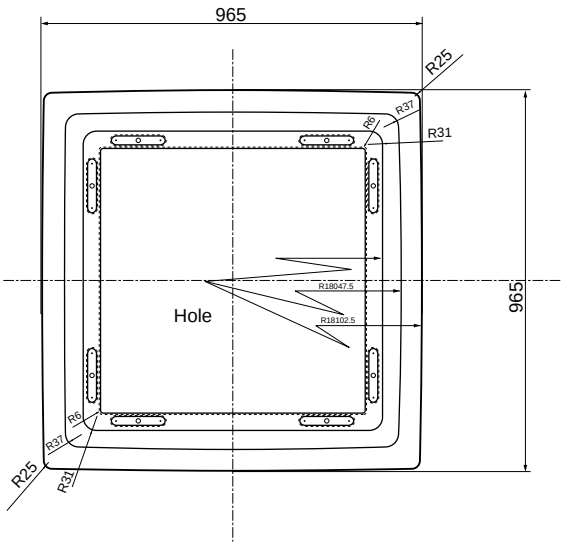
7. SPACE PANEL

Part No.	PAC-SE01AS-E
Applied Service Ref.	PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC



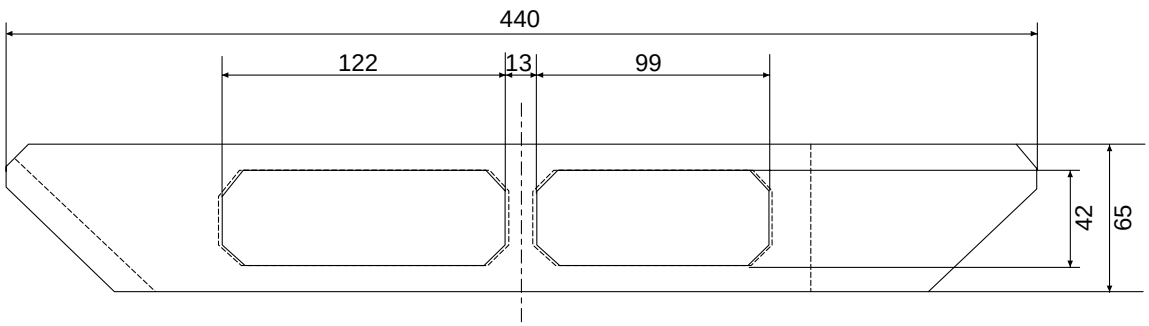
8. WIDE PANEL

Part No.	PAC-SE06WP-E
Applied Service Ref.	PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC



9. AIR OUTLET SHUTTER PLATE

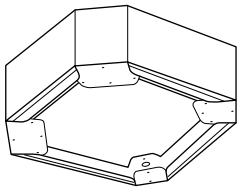
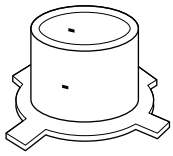
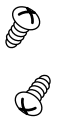
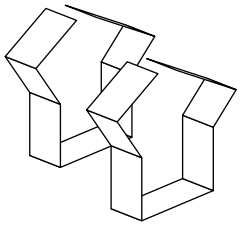
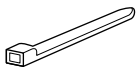
Part No.	PAC-SF38SP-E
Applied Service Ref.	PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC



10. MULTI-FUNCTIONAL CASEMENT

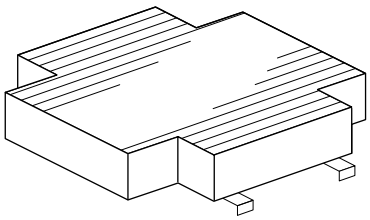
Part No.	PAC-SE21TM-E
Applied Service Ref.	PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC

Parts included :

Casement	Screw with washer	Duct flange	Tapping screw	Hook	Band
1 pc	4 pcs M5✕0.8✕15	1 pc	6 pcs 4✕10	2 pcs	1 pc
					

11. HIGH-EFICIENCY FILTER ELEMENT

Part No.	PAC-SE13KF-E
Applied Service Ref.	PLH-1.6KKHC/PLH-2KKHC/PLH-2.5KKHC



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HEAD OFFICE MITSUBISHI DENKI BLDG.MARUNOUCHI TOKYO100 TELEX J24532 CABLE MELCO TOKYO

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Issued in Jun.1997 NO. OC123 440
Printed in Japan

New publication, effective Jun. 1997
Specifications subject to change without notice